SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XVI.---No. 18. [NEW SERIES.] NEW YORK, MAY 4, 1867 $3 per Annum. [IN ADVANCE.]

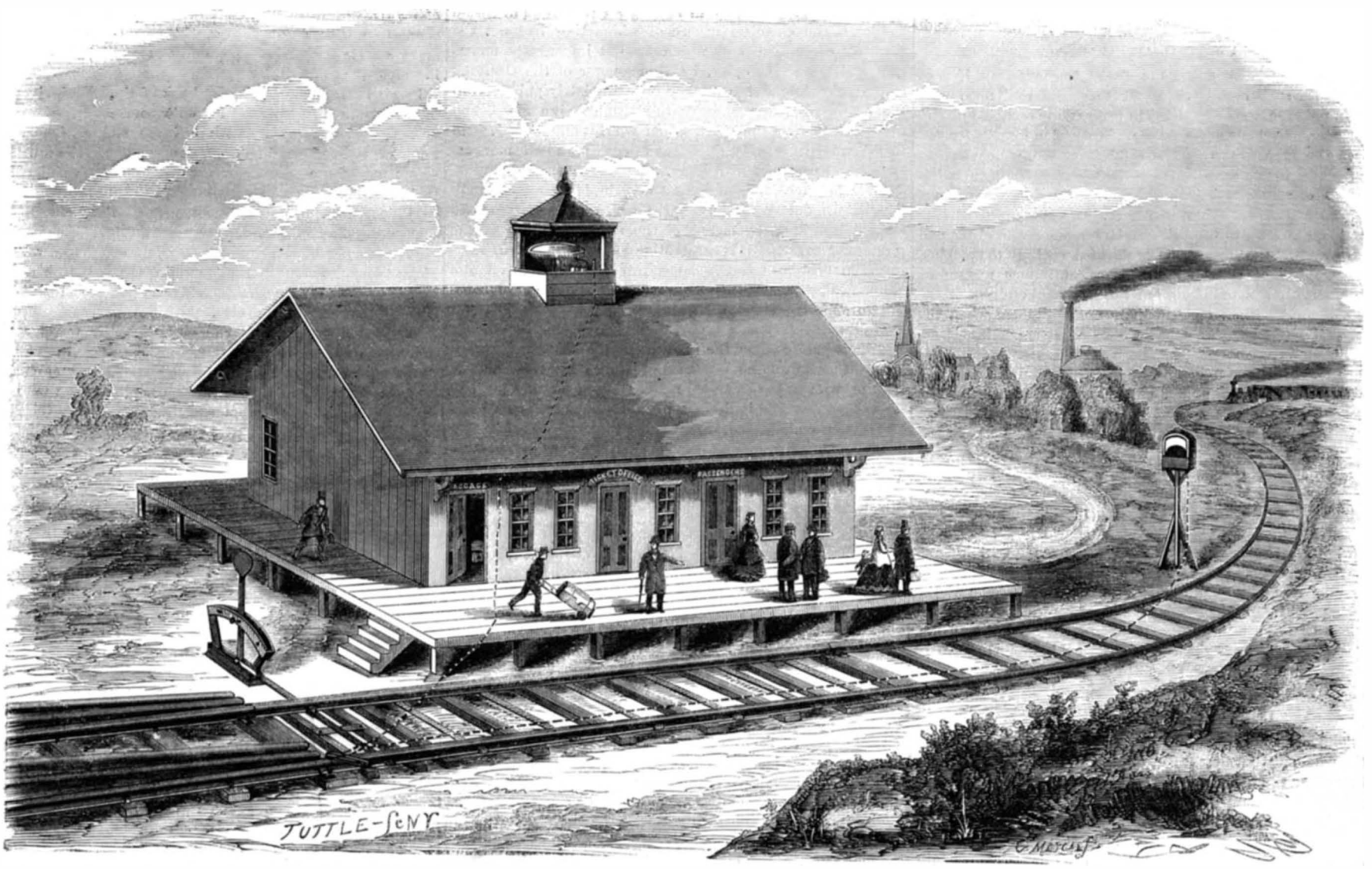
Improved Switch Signal and Alarm.

The most careful men are liable to mistakes. The deeply cut grooves of habit and method may at times be left for some erratic course, and where human weakness fails we must depend upon the infallibility of mechanism. Carelessness and thoughtlessness become criminal where human life is at stake, and this is particularly the case with the railroad switchman. Many lives are annually sacrificed and much property destroyed for the want of some reminder of duty to the switchman and some timely signal to the engineer of a train. A patent for such a device was secured through the Scientific American Patent Agency by Thomas S. Hall, of Stamford, Conn., Feb. 26, 1867, and is now in successful operation on a portion of the New York and New Haven Railroad.

The switch is worked by a hand lever in the usual way. On the under side of one of the rails, at its free end, is a downward projecting pin which engages with a horizontal lever by means of a slot near one end of the lever. To the other end of the lever is secured a cylindrical pendant plug, having on its lower end a snug with two parallel sides that fit in a suitable pipe of metal sunk in the ground, the top of it at the surface. A cap with rubber packing prevents the entrance of moisture into the tube. Below the lever plug is a wooden cylinder having two metal plates secured to its sides but not touching the tube, and projecting above the wooden cylinder on each side of the parallel sided snug. Now it will be evident that if the switch is shifted, the horizontal lever at the surface of the ground will be correspondingly moved with the switched rail, and the snug will be turned so that two opposite corners will come in contact with the projecting metal plates on the wooden cylinder. Consequently, if these plates are connected by insulated wires, one with the pole of a battery and the other with an electro magnet, the circuit may be closed or broken as the switch is moved in one or the other direction. This is precisely the principle and the operation of this device. The wires are inclosed in an insulating material and carried under ground (for explanation in the engraving, shown above ground) to a battery and gong or bell placed in a cupola on the roof of the station house, as in the engraving, or in any other convenient place to give an alarm. When the switch is in line with the main track the circuit is broken and no alarm will be given, but when the switch is misplaced the circuit will be completed and a hammer will vibrate against the gong and continue the alarm so long as the switch is off the main line. It will be seen that the switchman will thus have a perpetual reminder of his duty if he neglects to replace his switch, or that some employe will have his attention directed to the oversight.

In addition to this alarm addressed to the ear, a signal is shown simultaneously with the alarm by similar means. In the engraving the signal is shown on a post at a distance from the switch sufficient to enable the engineer to stop his train before reaching the switch. In the daytime this is the ordinary red and white signal, and in the night the red or white light. Of course this signal may be placed as far away from the switch as may be desired, the connection being made by the wire passing under ground.

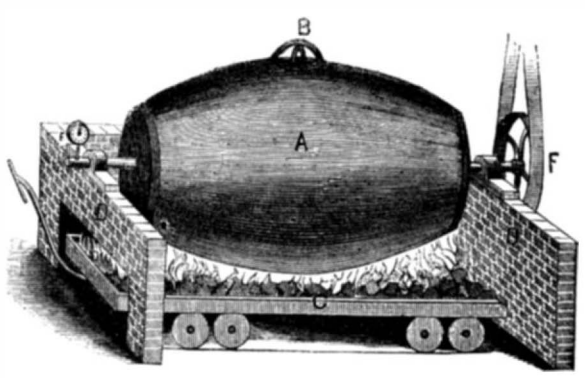
This device may be seen in operation at the Merchants' Union Express Company's Office, 365 Broadway, corner of Franklin street, New York City. It is being introduced already on several railroads, and as there is no machinery to get out of order and the cost of keeping in operation is only that of replenishing the batteries once in two or three months, and its operation is certain, it may be considered as an effectual preventive of accidents from misplaced switches and the draws of bridges to which it can be as readily attached. Any inquiries addressed to the patentee at Stamford, Conn., will meet with prompt attention. Patents have been secured in foreign countries through this office.



HALL'S SWITCH SIGNAL AND ALARM.

A NEW AMALGAMATOR.

The accompanying engraving represents a new amalgamator and desulphurizer. Recent trials have been made upon some of the most refractory ores with remarkable results, so much so that its owners anticipate a complete revolution in gold and silver mining. A, represents a wrought iron cylinder; B, man hole plate through which the cylinder is charged and emptied; C, a truck upon which there is a fire; *d d*, side walls upon which the cylinder rests; E, steam gage; F, belt wheel; G, safety valve.



The powdered quartz, mercury and sufficient water are placed in the cylinder, which is then closed air-tight and made to revolve slowly over the fire until the steam gage indicates 70 or 120 lbs. steam according to the nature of the quartz. If the quartz does not contain much refractory ore, 70 lbs. of steam is sufficient, if it does contain much, 120 lbs. of steam is necessary in order to thoroughly desulphurize and liberate the gold and silver. As soon as the required amount of steam is attained the fire is withdrawn and the cylinder is kept revolving until cool. It is then opened and emptied and is ready to repeat the operation. The machine will treat from 1500 to 2000 lbs. of quartz at a time, inside of three hours, at very little expense.

It is claimed for the above process, that the steam not only desulphurizes but drives the heated mercury through the quartz in every direction, and the revolving of the cylinder constantly intermingles the quartz and mercury, so that every particle of the gold and silver must come in contact with the heated mercury and consequently be taken up, thereby accomplishing a most perfect system of amalgamating and desulphurizing. Patented Dec. 22, 1865. Address John I. Staats, Patentee, 83 Amity Street, New York.

Cast Iron Boilers.

A correspondent from Indianapolis speaks unfavorably of cast iron boilers of the Harrison style, because one of cast iron rings which he used proved inefficient. He says his boiler was a series of circular pipes, one above the other, and connected at three points in the circle by upright tubes through which passed wrought iron bolts secured by nuts at top and bottom. These bolts, under pressure, would expand and the joints of the pipes leak badly, and at length one of the pipes burst. When taken apart the interior of the pipes had a coating three-eighths of an inch thick. The fire was made inside the coils.

Such a boiler we should expect to be a failure, but except being made of cast iron and bolted together we cannot discover any points of resemblance on which to make a comparison with the Harrison boiler.

RUBBER-CEMENT.—Caoutchouc 3 parts, naphtha 34—heated and stirred to solution—then add finely powdered shellac 64 parts.

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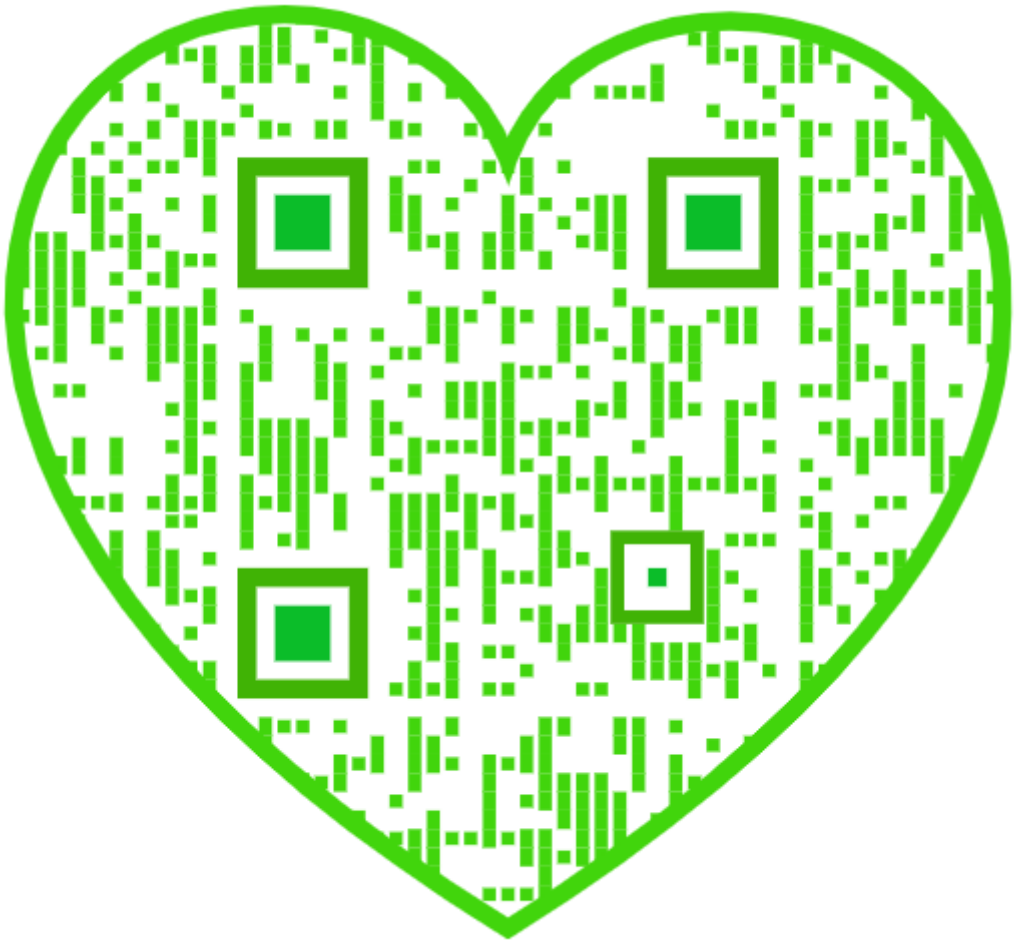

PARIS EXPOSITION--THE CHAOTIC STAGE.

Paris, March 29, 1867.

A FAIR ADMISSION.

It seems to have been the fashion among those who have written in reference to the coming Exhibition, whether speaking of the building or speculating on the probable interest of the articles to be exhibited, to give only the most qualified praise of the one and to express serious doubts as to the other. Of course if one is desirous to convey the impression that nothing whatever can be so imposing as to awaken any new sensation in the mind of the writer, he must express no extravagant admiration of what he beholds, no matter what his own impressions may be. As, however, for my own part I feel more anxious to convey to the minds of those who are not able to see for themselves, the impressions that are produced on a disinterested observer, as nearly as possible as they exist in his own mind, than to assume any affected indifference to the achievement of another nation, I shall admit frankly, that I experienced no little astonishment in walking around yesterday through the various departments of the main building and among the numerous additional edifices with which the surrounding park is filled. It must be admitted that no very extensive view is obtained from any one point, but this defect to the mere sight-seer will, I think, be amply compensated by the many beautiful promenades which will be prepared outside of the building, and which will no doubt, in the hight of the season, present as brilliant a spectacle as one can well imagine even in Paris.

EXTERNAL APPEARANCE.

It is extremely difficult, I am aware, to convey any idea of the size of such an inclosure, and therefore I shall not repeat the number of acres comprised in the park or occupied by the building. Perhaps some comparative notion may be formed from the statement that the central garden, which has an area equal to one twenty-fifth of the whole of the main building, is of about the length of Union Square, New York, by perhaps half the width of that park. Of the concentric elliptical rings of which the building is composed, the outer and in every way the largest one is devoted entirely to machinery. Outside of this, however, is a continuous restaurant more than half a mile long but not having the hight of the rest of the building, and therefore not prominent when the latter is viewed from a distance. The outside of this is entirely of transparent glass, and a very pleasant prospect is therefore presented to one while sitting at the tables of the surrounding grounds and buildings, as well as to promenaders under the roof which projects outward from this portion or appendage of the building. I was not particularly struck with any resemblance of the building to a gas holder, as the large round-topped windows of which the sides are principally composed relieve very much the unornamental appearance which I had supposed it to have. In order to give a clear space in the interior of the machine department, the main uprights in the walls of wrought iron are made very stiff and carried up to such a hight above the springing of the roof as to allow the necessary ties to pass above the crown of the arch. This adds very much to the appearance of the interior. The roof is, as might be supposed, tastefully painted, and though the girders and beams of which it is formed are all in sight, it is much more pleasing to the eye than where a maze of tie rods and braces breaks up the view.

INTERIOR OF THE MACHINERY HALL.

The large windows which, as already stated, occupy nearly the whole of the outer wall from the level of the exterior restaurant to the roof, are hung with ornamental shades bearing paintings of the well known antiquities of engineering or inscriptions appropriate to the nationality of the section in which they are situated. . . . . The moving machines are all arranged near the longitudinal center of the hall; on each side of the moving machinery are aisles for spectators; and on the wall sides of the hall are arranged the machines not in motion and kindred objects. The arrangements for bringing articles to their places in the building are very simple and good. From the lines of railway in the park, branches enter the building at each or many of the radial aisles or streets, as they are called. Then at each intersection with one of the circular aisles a turn-table is placed, and these aisles are themselves at present occupied by lines of rails, so that each article is brought by steam or horse-power directly to its intended position and there deposited by a steam crane also traveling on the same railway. The various sections are decorated in styles appropriate to the nations to which they are allotted, and in some cases the appearance is very rich, while in all the effect is much more magnificent than any thing that one can often see elsewhere.

FRENCHY GARDENING.

The gardens are certainly laid out with great taste, though one sees many things which are peculiarly French, in the way of trained trees whose branches are made to assume the most unnatural and fantastic forms, and similar fanciful extravagances. Along one of the promenades is a continuous bed of these. At the ends are trees whose branches are all in two directions at right angles to each other, thus forming appropriate corner pieces, while at other points they are arranged in symmetrical forms of all imaginable kinds. Artificial streams have been formed, or rather the beds of cement for them are prepared though the water has not yet been admitted, and over these are rustic bridges also formed of cement, but molded and painted in such a way as to form a very good imitation of the bark of wood. The grounds are full of ornamental buildings and cottages of all kinds, which though interesting and even elegant in many cases give it rather a crowded and heterogeneous appearance. Still, though the general effect is not the most pleasing, each part is in itself enjoyable and will afford instruction and amusement to the thousands who will visit it.

Slade.

Science Familiarly Illustrated.

How Cast Iron is Made.

Many of our readers probably suppose that what we commonly call iron is an elementary natural substance, and would be surprised to learn that like steel it is an artificial article of a complex character, answering to nothing found in nature. At the same time it is remarkable how imperfectly both the character and the formation of an artificial product may be understood by those who make it. It is not many years since real iron was first refined from the chemical compound of that name, and found to be a white soft metal, looking like silver, and easily pared with a knife. Even now, no one can tell us precisely what is done in the interior of those great, glowing piles where "ironstone" is melted up with limestone and comes out in the hard, brittle, granular, gray substance known as cast iron. It is a process that has come down to us from antiquity, where it was developed by experiment with little aid from science. Important as the improved and extended iron industry is to modern life, it is impossible for us to conceive of the hungry need that pricked on the primitive men in their search for the precious material of tools and above all of weapons. Nothing else could account for the success with which they felt their way to processes and results in manufacture, of the chemical nature of which they had not the slightest conception, and which we but imperfectly understand. Mr. Wm. Crossley, F.C.S., manager of the Ormesby Iron Works, England, in a series of papers lately published in the *Chemical News*, confesses this singular ignorance, and gives his theory of the process, and what it ought to be, from which we have already quoted as interesting to our more expert as well as youthful readers.

A blast furnace, we should first explain, is not a mere melting furnace, but a chemical retort for separating oxygen from the oxide of iron, by means of the superior affinity of the former for carbon. It is substantially an upright tube, varying from fifty to a hundred feet in hight; not to afford a chimney draft, for that is superseded by a mechanical blast, but to afford room for the chemical process demanded. By this process the iron is set free from the oxygen to which it had been subjected in the state of nature; but it exchanges that master for another—carbon—making it a carbide of iron, impure with other foreign matters, such as sulphur and phosphorus, which it derives from nature or the fuel and minerals in which it is smelted.

The smelting retort, as we will continue to call it, is made of various diameters, according to the hight, and the weight of ore intended to be reduced at a charge. Some lately built are as much as 102 feet in hight and 29 feet inside diameter. First, a hot fire of coke or charcoal is made on the hearth at the bottom, fed from the top and gently urged by a pressure of air through two tweers or inlet tubes, 2 to 4 inches in diameter, placed near the bottom and connected with blowing engines which will be made to drive a blast of great power through the retort, as soon as it is charged with ore. On the top of the fuel, which extends in the first place well up the shaft, the ore is fed in, mixed with limestone, both previously calcined by roasting in the open air, to drive off moisture and organic matter. The ore consists of iron in combination with oxygen, and this oxide (the same thing as "rust") is also mixed with various proportions of earthy matter which is chiefly silicic acid. To disengage this earthy matter from the ore, and to prevent the ore when melted forming with the silicic acid a silicate of iron (glass) and thus being lost, limestone is mixed with it, and the first effect of the hot gases passing upward is to decompose this as in a lime kiln, yielding lime. The lime, and the silicic acid or earthy matter mingled with the oxide of iron, now begin to act upon each other and form a crude silicate or glass which will soon be easily melted, and is then called slag. It is probable that at about the same time the carbonic oxide (carbon imperfectly oxidized, having only half the oxygen it will take) finds the iron oxide sufficiently heated and freed to deliver up its oxygen, which the carbon seizes, becoming carbonic acid, and leaving the iron free from oxygen and ready to melt as soon as it has settled a little further down into the intense heat. Here the slag or impure silicate melts, and a little later and lower the freed iron also melts, and at the same time probably combines with a portion of carbon from the fuel and thus subjects itself to what we have called its new master, becoming a carbide as it was before an oxide of iron. The carbide of iron (which we call iron for shortness, and because we used to think it so) falls by its gravity to the bottom or hearth, the slag swims on its surface, and the chemical work is done. The workmen open a door just at the level of the surface of the iron, and haul off the slag from it, after which a small hole at the bottom of the hearth is opened, and the iron runs out into molds.

This operation has occupied from 24 to 48 hours, according to the hight of the retort, and meanwhile alternate charges of fuel and minerals are fed in at the top until the whole retort is filled and kept full by continued charging as fast as the contents descend and make room.

Entering (mentally) with the blast at the bottom of the retort, let us trace the operations of the fuel and air ascending the shaft, as we have traced the descending materials, ore and limestone.

For many ores such a degree of heat is required—and for most it is advantageous—that the air blast must be heated before it enters. The blast has lately been brought to a temperature as high as 1,100°, and a great advantage in the heat from a given fuel is obtained by feeding it with hot air—Mr. Cross ley thinks four fold, up to the point where the blast shall be as hot as the fire itself. The first operation is probably the formation of carbonic acid by the union of two parts oxygen with one of carbon, and this evolves heat enough at this point to enable another portion of the carbon to recover an equivalent of oxygen from the carbonic acid, reducing the latter to carbonic oxide, which ascends until it meets the iron oxide and regains from it one equivalent of oxygen, becoming again carbonic acid and leaving the iron free, as we have before seen. In the improved modern furnaces, the carbonic acid, escaping carbonic oxide, free carbon or smoke, and other gases, are caught at the top of the shaft in contrivances for the purpose and taken off in pipes to reservoirs, whence they are fed into independent furnaces and burned with other fuel and air blast, to heat the blast for the smelting furnace and raise steam for the engines.

BUSINESS AND MANUFACTURING ITEMS.

Western Manufactures.—The age of our eastern manufactures not only renders them the representatives of American manufacture in general, but has established the East as the only seat of home manufacture worthy of notice in the eyes of most of men interested in our national activity.

In the mean time the rich western states are working quietly and slowly on, and before long they will step in beside the ponderous eastern production of skill and handicraft.

As an instance of this silent progress we mention the town of Peoria, Ill., little noticed and hardly ever mentioned in connection with manufactures, while in these it surpasses many a place of double its population, standing behind none in proportion to the latter.

Peoria is situated on the west bank of the Illinois river and lake Peoria, which is simply an enlargement of the breadth of that river midway between Chicago and St. Louis. An immense bed of bituminous coal underlying it, the town possesses one of the great elements of manufactures, abundant fuel, which costs in Peoria about one third of what it is worth in Chicago, St. Louis or Cincinnati, and about one half of what it does in Pittsburgh; its price varying from seven to eight cents per bushel or about two dollars per tun, which is about twice the value of that material before the war. This coal is produced from one hundred and three coal banks, actively worked around the city.

The communications of the city with the world by rail and water are quite respectable, eight different lines of railroads meeting there, while the Illinois river, by way of canal and lakes gives a desirable water communication with the East, and by the Mississippi and tributaries with the South and West. Being situated in an agricultural district the chief branch of manufacture is that of highwines, of which seven hundred and sixty-two barrels are produced daily, in fourteen distilleries.

The revenue which accrues (or ought to) to the government from this single branch of industry in Peoria, amounts to the neat little sum of $60,960 a day; which is doing pretty well for a city of 20,000 inhabitants. Three distilleries burnt down within the last two years had even a greater capacity than any of those now existing. There are also eleven rectifying establishments in Peoria, producing in the aggregate 375 barrels of cologne spirits per day.

Eight establishments produce two hundred barrels of beer per day, and four vinegar factories, sixty barrels of vinegar, which is said to be sufficient to sour the entire population of the town, otherwise very amiable. The Peoria Pottery Co. formerly produced all kinds of pottery, but is now confined to yellow stoneware. The clay for the works is brought from a distance of eighty miles. It is mixed with water by exceedingly heavy machinery to a uniform mixture, having the consistency of milk, which passes through screens, where sand and other coarse impurities are retained.

The liquid passing through the screens travels over a long inclined plane, where the coarsest clay is again deposited, while the finer, suspended in water, runs into large tanks, where it is deposited by rest. Afterward the clay paste is transferred into a huge sheet iron pan, and dried by heat to a consistency adapted for molding. The clay remains upon the plaster molds for twenty-four hours. The earthenware is then dried around stoves for a few days, then introduced into mufflers and placed in a large furnace.

The Peoria Paper company manufacture all kinds of wrapping paper, but chiefly straw paper, the material for which is there cheap and abundant.

An equally extensive establishment, The Peoria Starch factory, produce at the rate of a tun and a half per day. There is also a woolen mill, three coffee and spice mills, eight flour mills with a daily product of 1930 barrels of flour, and barrel factories of a capacity to supply all the establishments before mentioned. All these establishments require founderies and machine shops, of which there are four, beside two brass founderies, two boiler shops, two copperworkers and two millbuilders. Four plow factories, for cultivators, and two for cornplanters; two for pumps and wooden tubing, one for water buckets and drawers, three for sash, doors, and blinds, five for brooms, two for lard oil and candles, and wagon, saddle, and harness factories etc., as abundant as in most other cities, complete our survey of Peorian manufactures. About ninety engines are employed in these establishments.

Joseph Hirsh.

The Gatling Battery is attracting favorable notice in England, where a trying experiment has been sustained by it under direction of the Government, at Shoeburyness. Owing to an accident, one of the barrels could not be fired; nevertheless, 76 shots were made in 80 seconds, discharging 1,216 bullets, 668 of which were counted on the target in spite of a strong cross wind.

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Editorial Summary.

ANOTHER CAST STEEL PROCESS.—As the Bessemer method consists in the simple oxidization of the carbon contained in iron, by penetrating it throughout with a blast of oxygen mixed with nitrogen (air) it is evident that mixing with the iron any substance capable of evolving oxygen would effect the same result. Mr. Bessemer patented this idea; but the substances, such as the nitrates of soda and potash, most available for yielding oxygen to iron, are very destructive to the vessel employed in the process. To meet this difficulty Mr. John Heaton, now of the Langley Mill Steel and Iron Works, Nottingham, patented, about a year ago, the plan of placing the salts in pockets within the fireclay lining of a revolving converter, so that all parts of the whirling mass might be brought in contact with the re-agent. It appears that about 5 per cent by weight is a sufficient proportion of the nitrate to be added to the iron for its conversion into steel. Samples of the product are spoken of as showing a fine silky fiber at the fracture.

ALUMINIUM IN DENTISTRY.—Dr. J. B. Bean announces in the *Dental Cosmos* that he has succeeded in discovering a process for fine casting in aluminium, which will enable the profession to make plates for artificial dentures preferable in all respects to those of any other material, from gold to vulcanite. In strength and rigidity he affirms that the aluminium plate, when properly cast with very slight and suitable alloy, is far superior to gold and platinum of the same condition and thickness, while its extreme lightness is one of the most desirable of qualities. In cleanliness nothing can be better: it has no more taste than porcelain, its brilliancy is much more lasting than that of silver, plates worn for weeks without cleaning exhibit no change, and sulphur and sulphuretted hydrogen, which attack silver aud gold, have no effect whatever on aluminium. Its lightness is the great difficulty in casting it in fine molds, and a peculiar process had to be originated, which the inventor generously declines to patent, although he thinks the apparatus used should be covered by a patent, as an article of manufacture. Eminent dentists are said to have pronounced it "the great desideratum attained."

ARTIFICIAL PERCEPTION.—It has been suggested that the supposed odylic force (animal magnetism) may possibly, if there is such a thing, be brought to artificial tests and measurements, by means analogous to those by which we separate and exhibit the distinct forces contained in light, or the allotropic states of the threefold substance to which oxygen belongs. What could be the nature of an odylic battery, wherein this mysterious force might be caught, stored, concentrated and brought under examination? All we know is that it must be some arrangement of those living leyden jars (too often cracked) which in all ages have more or less perambulated wi h startling if not shocking effect. It is unfortunate that most of the attention hitherto devoted to this subject has been that of persons to whom the rigor of scientific inquiry is foolishness.

ENDLESS HOIST.—A recent English patent presents a very simple and efficient application of the endless hoist principle, commonly used for grain and flour, for building and general purposes. Two parallel endless chains pass over separate par allel pulleys widely enough apart for the hoisting boxes or cages to swing clear between them, and are connected at proper intervals by iron bars from the centers of which the cages are suspended. Four of these pulleys being arranged equi-distant like the four wheels of a car truck, at each end of the hoist, permit a constant succession of cages to pass each other going up and down, remaining always right side up.

BETTER LEATHER.—The *Shoe and Leather Reporter* argues a reasonable prospect of improvement in American leather, from the energy stimulated in the manufacture by the war. Although capital and energy were then turned in the direction of rapidity and quantity at the expense of quality, yet there is nothing now to prevent this power being transmuted from speed to force, and applied to thorough and excellent work, removing the stigma of inferiority from American leather and transferring to our own manufacturers the demand which now goes abroad.

SILICA IN GRAIN STALKS.—Pierri, the French chemist, has re-examined the grasses and has apparently thrown some further light on the agency of silica, which was once erroneously supposed to give the stalk its rigidity. He finds on the contrary that in the wheat plant the silica accumulates chiefly in the leaves and least of all in the hard knobs or joints of the stalk; the latter containing less than one seventh as much as the leaves, and the stalk between the joints less than one-fourth. Hence, the more silica the more leaf, the more shade, the less hardness in the stalk, and the greater liability to break down or "lodge."

PROFESSOR AGASSIZ' immense collections in Brazil have been in good part opened and arranged (except about sixty packages) in the museum of Comparative Zoology at Cambridge. They include 50,000 specimens of fishes, representing over 2,200 species, 2,000 of which are supposed to be new to science. This collection now exceeds those of the British Museum and Jardin des Plantes united, containing altogether more than 9,000 species.

SUBMARINE TELEGRAPHS to the number of 72, with 12,008 miles of cable, are now in successful operation; 23, of 9,053 miles, have have been worked but have since given out, and 9, of 862 miles, have been total failures. In addition to these there are 95 lines under American rivers.

EXCAVATOR.—A new railway bridge is being erected over the Clyde, at Glasgow, on cast iron cylinders 8½ feet in diameter, filled with concrete and penetrating through the sand to the bed rock at a depth of 85 feet. An excavator invented by Mr. John Milroy is used with great advantage in sinking these tubular piers. Its construction may be illustrated by supposing an octagonal disk of steel plate to be divided on all its diagonal lines, so as to make eight triangular plates. Let these plates be each hinged by its external side on an octagonal frame filling the interior of the cylinder like a piston head, so that when free they will hang vertically, points downward, and may be forced downward into the sand as spades; and when drawn up again to a horizontal position by chains attached to their points, they will converge and form a tight bottom, supporting the sand brought up with each spade. The further details necessary for working the plan may obviously be adjusted without difficulty, and the novel piston be made to pump the sand from the bottom of the cylinder as fast as it can rise and fall.

EARLY STRUGGLES.—The Illinois eight-hour law encounters great difficulty in getting into practical operation, from the want of a general concert of manufacturing states in the movement. It is of course impossible for employers to pay the excess of wages over their competitors in other states, and they will be obliged, and are preparing, to close their factories and shops, unless the hands consent to have the twenty per cent taken off equally from the work and the wages. Of these alternatives, neither working on four-fifths time nor being turned out of employment altogether, is the entertainment to which the operatives were invited. It would seem to be their only policy, at this stage of their movement, to content themselves with the initiation of the eight-hour standard of day's work, adding two hours overtime for the old wages at present, and leaving the advance of wages until a period when it can be made simultaneous and so practicable in all states.

GAS LIGHT IMPROVEMENT.—Any of our readers who burn gas can test for themselves a simple device by which a Mr. Scholl of London proposes to increase the illuminating power of a common gas burner by more than 50 per cent. Hold a strip of thin sheet brass or other metal, one third or half an inch wide, in the centre of the flame, splitting its thickness (not its breadth) and nearly touching the two holes whence the gas issues, so as not to obstruct the passage, but to divide the jets and check the velocity of their upward current. The division and the check will favor a more intimate access of oxygen to the gas, and hence a more perfect and brilliant combustion. Mr. Scholl uses a platinum strip resting in slits in a brass ferrule fitted over the burner tube.

SHARPENING FILES.—J. S. C., of New York City, says that when files become clogged and dulled they should be bathed in strong potash water to remove all grease, and then immersed endwise in a jar of one gallon soft water, two ounces tartaric acid and half a pint of sulphuric acid. Let them remain a few hours, remove them, and after washing in clear water put a little oil on the teeth. A second immersion in the acid before oiling and after washing is sometimes an advantage. The acid etches the teeth, or rather the interstices, and sharpens the file. We have heard of this before, but have never tried it.

A FRENCH WAY OF RIDING ON HORSEBACK.—Make a pair of enormously large wheels, and place a carriage body over the axle and shafts so high that the horse can travel under it and between the wheels. You will have a most symmetrical turn-out, such as they use in Paris, a beautiful dissolving view of driver, horse and carriage in one, defying man's wit to tell where either begins or ends, and a lofty perch where you can both see and be seen.

THE STABILITY OF OXIDE SURFACES is illustrated by a curious little experiment. It is said that writing in ordinary ink on the molded surface of an ingot of pewter, will remain after the metal has been remelted and cooled again within the same mold, even though it may have been stirred during the operation. It is supposed that an oxide is formed by the writing, which is not reduced by the melting.

HARD HYDRAULIC CEMENT.—A cement which is said to have been used with great success in covering terraces, lining basins, soldering stones, etc., resisting the filtration of water, and so hard that it scratches iron, is formed of sixty-three parts of well-burned brick and seven parts litharge, pulverized and moistened with linseed oil. Moisten the surfaces to which it is to be applied.

A SENSIBLE SILVER FORK.—An obvious improvement has been introduced by a Birmingham manufacturer, which consists in making the fork whole and hollowed or fluted for about two thirds its present length, leaving the prongs of the sufficient length of half or three fourths of an inch, the implement becoming thus a partially "split spoon," convenient for small particles, liquid or semi-liquid ingredients, peas, and the like.

SOLIDIFIED GLYCERIN.—An English company are now manufacturing a toilet soap with which solidified glycerin is amalgamated in equal proportions by weight. The result is a semi-transparent tablet which lathers well and wears well, and deserves a wide popularity.

STEEL BOILERS.—The Paris and Orleans railroad has 13 locomotives with steel boilers, the Southern has fifteen, and the Paris and Sceaux has a number. The substitution of steel for iron in this direction is making rapid progress.

ACETYLENE—A colorless gas, consisting of two equivalents each of carbon and hydrogen, is contained in small quantities in coal gas, and is supposed to have been the cause of certain mysterious and hitherto unaccountable gas explosions. It may be separated from the coal gas by passing the latter through a solution of ammonia-sulphate of copper, precipitating a reddish brown deposit of acetylide of copper. This being very explosive, igniting with slight friction, is supposed to have been the cause of several explosions which have occurred in moving copper gas pipes and in altering meters where the brass work had been much in contact with the gas, and a deposit of acetylide of copper might naturally have been formed. It is a curious fact that if chlorine gas is turned into a jar of acetylene gas even in darkness, an explosion will ensue, but not so if the acetylene be turned into the chlorine, unless a moderate degree of light be present. In the latter case, the chlorine unites with the hydrogen, setting the carbon free, so that the vessel, which previously held a mixture of colorless gases, is instantly filled with a mass of inky black smoke, giving the jar the appearance of patent leather. These observations are derived from a late lecture by Prof. Frankland.

MINING EXPLOSIONS are rare in this country, from the very limited number and depth of bituminous coal workings. The late explosion in the Clover Hill mines, Chesterfield, Va., is, however, a sad warning, and proves that stringent regulations and improved safeguards are matters of deep interest in this hemisphere as well as the other. Our bituminus coal beds are of vast extent, and destined yet to be as extensively worked. It seems in this instance, gross neglect of both rules and specific orders caused an inexcusable calamity by which sixty-nine persons were cruelly put to death. The removal of the door that closed a disused upset, or gallery, and neglect of an order to replace it, and a further neglect on the fatal day to make the regular examination for dangerous gas at the same place; these were the conditions, naturally leading to the possibility of a disaster which might otherwise have been prevented. There were two deputy gas men, each of whom successively neglected their examination at this point, at morning and at noon; the first by his own admission, and the second, who was killed by the explosion after ostensibly completing his examination, and of course could not have performed his duty, else his life and those of sixty-eight others would have been saved.

THE PARIS BOURSE has been connected with the Grand Hotel by a pneumatic dispatch tube about three quarters of a mile long and 2½ inches in diameter, through which a cylindrical box containing forty envelopes can be sent in one minute. The atmospheric pressure is obtained gratuitously by means of the ordinary pressure in the water pipes. The water is introduced into a close reservoir of two chambers, the first connected at the top with the second by an escape valve, and when the first is filled with water, of course two atmospheres are in the second: then the water is drawn off and outer air admitted, and water is again allowed to run in as long as its force suffices to inject it. Nothing remains but to leave the apparatus in this condition, while drawing off water as it is wanted for ordinary purposes, air entering as water is removed, through an inlet valve.

DEODORIZING PETROLEUM.—M. Joule, chemist of London, patents the application of deutoxide of nitrogen, or nitrous gas obtained from nitric or fuming nitrous acid and metallic filings, and conducted by a tube into the bottom of the vessel of petroleum, until the fumes reach the surface, when it is thoroughly agitated, and closed until a satisfactory result is perceived. Or, the gas may be mingled by pressure with the vapor of petroleum in the still. Or, three or four lbs. of the acid may be thrown into a 40 gallon cask of petroleum and thoroughly agitated, after which thrust in two lbs. moistened metallic filings, and repeat the process with further additions if necessary. Afterward, wash the petroleum with suitable alkaline substances, and agitate with it about 6 lbs. of fresh slacked lime to the cask.

BREECH-LOADING ARMS IN EUROPE.—The Belgian War Office having instituted an inquiry into the armaments now going forward, finds the following numbers of breech-loaders now ordered and in process of construction or conversion, viz:—Prussia 1,100,000, France 480,000 (Chassepot), England 350,000 (Snider, converted), Austria 600,000 (Wanzl, converted), Russia 600,000 (Carlo needle-gun con-verted). Italy, Spain, Portugal, Greece, Belgium, Holland, Denmark, Bavaria, Wurtemberg, Baden, Hesse-Darmstadt, are all making or procuring breech-loading arms, or have voted funds for the purpose. Breech-loading and rifled cannon are also largely ordered.

PURE SILVER.—At a recent meeting of the California Academy of Natural Sciences, Mr. Gutzkow presented a sheet of chemically pure silver, three feet in diameter, three ounces in weight, and as thin as fine paper. The color was beautifully white, and the texture like fine lace. This sheet was made by mixing solutions of protosulphate of iron and sulphate of silver in a large dish, and the silver rose to the surface, and there formed into a sheet. Successive sheets will rise with each stripping. This easy mode of obtaining chemically pure silver is of much practical value.

STABLE'S PROCESS OF BEEF PACKING, now in use in Texas, consists substantially in substituting carbonic acid for air in contact with the meat. A little salt is used, and the bone removed, and the meat is placed in cans in carbonic acid in an air-tight box.

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THE TRICKS OF THE ALCHEMISTS.

During the sixteenth and seventeenth centuries the practice of alchemy was held in the highest repute by men of learning, while princes and even kings were seized with the popular delusion. At the same time spurious alchemists infested the country, passing from town to town and by the most specious deceptions imposing upon the inhabitants. These practitioners with the greatest ease procured from their dupes necessary funds which they—as the pioneers in the cause of science and on the point of making the grandest discovery that had ever enriched the world—required to complete their costly experiments. The more readily to attain their ends the pretended alchemist would exhibit to the gaping multitude, sometimes an apparently rusty nail which he, with great gravity and muttering some cabalistic words, would plunge into the wonderful liquid of transmutation: after the lapse of a few moments the nail is shown with its lower portion turned into the precious metal. With such proof before their eyes the credulous audience could not withhold the small pittance, their insignificant offering on the shrine of science, which the learned operator needed to renew his wonderful liquor and the cunning pretender repaints his gilded nail, fills again his vial with pure water, and passes to the next village. Sometimes a lump of lead was exhibited into which a piece of gold had previously been introduced. On heating, the lead was gradually oxydized, leaving the precious metal behind: or a crucible, concealing beneath a false bottom a bead of silver, is exposed to the action of heat, some simple powder being now thrown in, the vessel is cooled, broken, and the silver is discovered. Even such a shallow deception as washing a coin with quicksilver, thus giving it a silvery appearance, proved sufficient to deceive the simple populace.

But while these impostors were thus successful, the study of alchemy was faithfully pursued by such scholars as Augurello, Cornelius Agrippa, and the unfortunate Bombastes Paracelsus. Hitherto the sole aim of these enthusiasts had been the transmutation of the base into the precious metals: but about this time a new object to be attained presented itself. The success which had attended the use of mercury, antimony and several chemical preparations in the treatment of certain diseases awakened, the hope that by diligent study the discovery would be made of some universal menicine which should heal all disorders, and prolong human life indefinitely. This new field was occupied by new zealots, and one of these was Paracelsus, who, maintaining that strong distilled alcohol was the desired elixir vitæ, fell a sacrifice to his enthusiasm by drinking too freely of this preventive of old age.

The decline of alchemy may be dated from the middle of the sixteenth century. Few writers of reputation after that time wrote professedly on this subject, though a kind of half belief in its truth was long after cherished by even the most eminent chemists, and occasionally individuals appeared boldly claiming success in the science: such men were Agricola, Denis Zachaire, Dr. Dee and his co-laborer Edward Kelly and, as the last of the alchemists, Helvetius, Jean Delisle, the Count de St. Germain and Cagliostro. Even so late as the year 1784 Dr. Price, F. R. S., publicly proclaimed his ability of creating gold at will, but an investigation into his process being determined upon by the Royal Society, finding detection inevitable, the would-be alchemist finished his course by committing suicide.

The poverty of the alchemists as a class became proverbial, thus though avowedly in possession of the art of making gold, they were at any time willing to divulge this secret merely for a small amount of what they pretended to produce in any quantity. Although it cannot be claimed that the researches of these philosophers were in the domains of true science, yet in their fruitless efforts for obtaining the philosopher's stone, or the elixir of life, the world acquired information of far more value than the possession of either would have conferred upon it, in the advancement made in the rudiments of what has since their day developed into the grand science of chemistry.

The Engineer's Alphabet.

First obtain a fair familiarity with the mode of working out all ordinary arithmetical questions, and also a knowledge of algebra as far as simple equations. Learn also the elementary problems in mensuration, and how to measure hights and distances, and how to level and survey land.

Next gain some general knowledge of the principles of chemistry and of geology, and of the qualities of stones and cements, the action of the tides, the force of the winds, and the amount of rainfall.

Next obtain a thorough familiarity with the strength of materials, and acquire a distinct apprehension of the laws of virtual velocities and of the conservation of force.

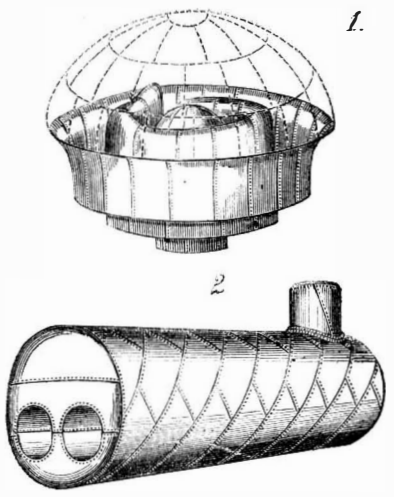
The law of virtual velocities enables the strain placed upon any part of a machine or structure to be immediately computed when we know the weight or force applied to any other part, and by this expedient, joined to a previous knowledge of the strength of materials, it can easily be determined whether any machine or structure is strong enough. Thus in a crane, if the interposed gearing is such that the travel of the handle through 100 in. will cause a tooth of a certain wheel to move through 1 in. then we know that the strain upon that tooth will be 100 times greater than the force applied to the handle, and so in all other proportions. So, also, in a beam or girder of iron of which the top flange is incompressible, if we wish to determine the breaking strain acting upon the bottom flange when the beam is loaded in the middle, we have only to suppose that the beam has been broken, and if we find that the broken edges separate only 1 in. while the weight falls through 6 in., then the strain at the edge of the beam seeking to sever it is six times greater than the weight.

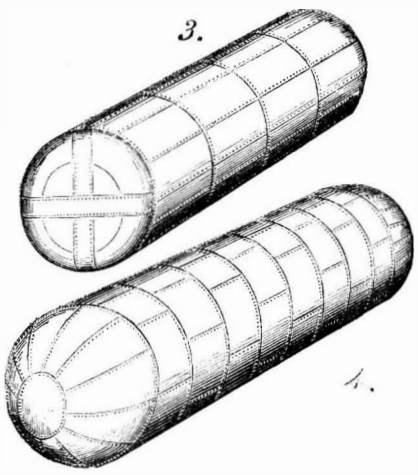
The law of the conservation of force teaches that a force once existing cannot disappear except in the creation of some equivalent force, and one corollary of this law is that no form of mechanism can create power. Hence in a steam engine, if the steam were to be condensed by a jet of cold water immediately as it issued from the boiler a certain volume of hot water would be produced. But if the same steam be allowed to flow through the engine, and be finally condensed in the condenser, the resulting volume of hot water will be less in the proportion of the power exerted by the engine. Heat being a form of power, it follows that if a certain portion of it goes to generate mechanical power in the engine, there is less to expend in raising the temperature of the water by which the steam is condensed.—*Engineering.*

STEAM BOILERS---THEIR FORM, CONSTRUCTION, AND MATERIAL.

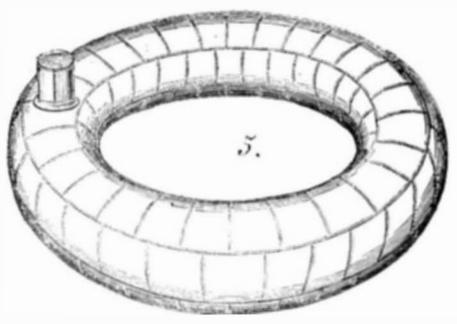
[NUMBER TWO.]

The balloon or haystack boiler, two engravings of which appeared in our article of April 27th, was attempted to be improved by increasing its heating surface by constructing a central dome-like fire place with a curved flue conducting the gases of combustion through one evolution within the boiler before passing around the outside. It is shown in No. 1. The dotted lines show the exterior form of the boiler. Its construction, although improving the boiler for a steam generator, greatly weakened its strength.



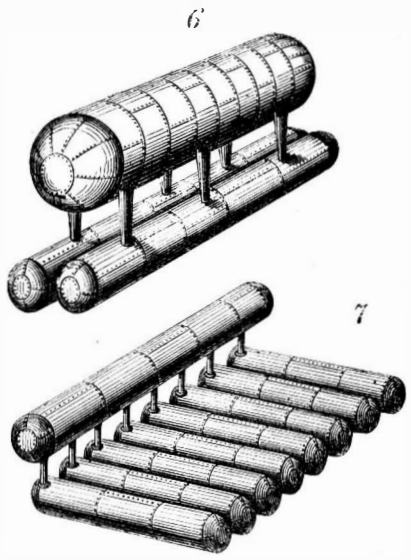


The object of increasing the strength of boilers by diminishing their diameter led to the construction of boilers of a cylindrical form. They, however, had flat ends generally of cast iron, as are hundreds still in use in this country. The flat surface has much less resisting power than a convex surface, and as cast iron will not yield much without breaking, the blowing out of the boiler head is the usual form the explosion takes in case of accidents to this class of boilers.



Long stays running from end to end are employed to keep these heads rigidly in place; in flue boilers the flues themselves are the stays. This tendency to cracking of the cast iron head suggested the wrought iron head, seen in Nos. 2 and 3, and in some cases the employment of bands crossing at right angles as in No. 3. To further strengthen the shell of the boiler the seams of the plates were sometimes made to run diagonally, as in No, 2.

No 4 shows an improved form of cylindrical boiler in which the ends are hemispherical. This form is now so extensively used in England that boilers of this shape greatly outnumber those of all others. This shape renders them very strong, as the whole body of the boiler is in simple tension and internal pressure has no tendency to alter the form. Plain cylindrical boilers externally fired have the advantage of being easily cleaned internally and are accessible to necessary repairs; but that part upon which the flame impinges is liable to be weakened by the action of the heat, especially when the boiler is of great length, as seventy or eighty feet, not—an uncommon length—and the heat has to act upon a large body of water at one point or on a circumscribed and limited area. Mr. Marten, from whom we largely quote, says he has seen a modification or rather extension of the cylinder boiler where great surface was obtained and extreme length avoided by curving the shell until both ends met, making an annular or ring boiler, seen in No. 5. It had a diameter of five feet for the cylinder with an external diameter for the ring of twenty-five feet, giving a total length of about sixty-three feet. It has worked for years well although exposed to the heat of six puddling furnaces.



As large diameter for boilers is a source of weakness, and the immense body of water just over the fire is a hindrance to the rapid generation of steam, the elephant boiler or as commonly known, the French boiler, so called from its general use in France, has been designed. It is seen in No. 6 and is merely a combination of small cylinders connected by upright conical tubes. The large upper cylinder is the steam chamber. The disadvantages of these boilers are difficulty in cleaning or examining internally, and the exit for the steam from the generator to the steam cylinder being cramped, tending to priming and hindering the free generation of steam. The same objections apply to the retort boiler No. 7, although both of them expose a large surface to the action of the heat, and consequently are better generators than the plain cylindrical boiler.

GLEANINGS FROM THE POLYTECHNIC ASSOCIATION.

The regular meeting of this branch of the American Institute, was held on Thursday evening, April 11th, Prof. Tillman presiding.

MISCELLANEOUS PROCEEDINGS.

The chairman read a collection of scientific items, after which a long discussion arose respecting the merits of corrugated iron in the construction of boilers. Dr. Bradley followed, explaining a plan for preventing incrustation of boilers, which was simply passing a continuous current of free electricity through the iron. After some further transactions the society listened to a paper from Mr. H. F. Walling advancing a new hypothesis relating to

MOLECULAR MOTIONS.

Mr. Walling proposed to refer all the forces of nature to one simple or universal force. Gravitation, he considered to be the resultant of equal infinite and opposite forces, intercepted by matter, thereby causing a diminution of the two opposing forces between the atoms, and a preponderance of the external force; thereby impelling the atoms toward each other. All molecular attractions are the results of gravitation in atoms, repulsion being due to the excess of momentum over gravitation. Heat, the great repulsive force of nature, is simply the momentum or centrifugal force of atoms.

In the molecular hypotheses advanced by Boscovich, Mossotti, and Prof. Norton, the conditions of solidity and fluidity are explained by supposing the ultimate atoms to be solid and encompassed by an elastic etherial atmosphere, but the inquiry suggests itself, whence is derived the atomic solidity and fluidity? In this hypothesis, the only properties attributed to ultimate matter are position, and inertia, or the capacity for associating with force and acquiring motion. Repulsions, attractions, impenetrability, elasticity, etc., are the manifestation of this associated force, and are not the inherent properties of matter. Atoms, the speaker supposed, actually moved around each other in pairs, describing in three intersecting planes, circular or elliptical orbits upon the surface of imaginary spheroids. The intersections of these orbits form six poles, each a central point in a face of an imaginary circumscribing prism. Since heat is momentum, uniform temperature is maintained in atoms of different weights, when the products of mass into velocity are equal. It follows that pairs of heavy atoms move slower than pairs of lighter ones. This explains the spheroidal forms of certain molecules, from which all forms of crystaline structure arise. Solidity and liquidity are due to the interlinking of the orbits of adjacent molecules at the six poles, a single interlinking producing liquidity, a double one solidity. The rigidity of solids is the result of this polar attractive force. The conversion of solids into liquids and liquids into gases by increasing temperature, is caused by accelerated momentum of the atoms overcoming the interlinking or polar force. A reverse action takes place when heat is dimin-

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ished. In gases the centrifugal force predominates and there is a constant tendency of the atoms to separate.

Mr. Walling exhibited drawings and models, and gave a mathematical demonstration of the stability of a system made up of atoms moving as described, and proposes to pursue further the investigation of the subject.

[For the Scientific American.]

BREAKAGE OF CAR WHEELS--THE CAUSES AND REMEDIES.

The subject of car wheels has not had the attention its importance demands, and so important is it to the public that many have thought a Government Inspector should be appointed to inspect every wheel before it is put in use. The lives of millions of our citizens are constantly in jeopardy while traveling over our railroads, and what may insure greater safety should receive the earnest attention of the National Government. If the inspection of boilers on steamboats is necessary, surely the same precaution is desirable in railroad trains.

Cast-iron wheels are so fully established in this country, that it is scarce worth while to attempt the introduction of wrought iron or any other kind of wheel, but what may improve the quality of wheels is worthy the attention of all railroad managers, car and locomotive builders. A proper chill on poor iron may insure a wheel under favorable circumstances to wear as long as a wheel made from iron of a better quality. If, however, any unusual strain comes on the wheel, the poorer iron may fail in the time of need, when the better iron would have withstood the shock. Cheap wheels seem to be more sought after than those of a better quality costing more. The best charcoal iron, remelted in a cupola, always deteriorates in quality. It becomes anthracite iron and assumes all the qualities of anthracite iron, and will rarely show a tenacity of over eighteen to twenty thousand pounds to the square inch. High tenacity, when the proper degree of mottle is maintained, will always produce the best wheel, as it not only has tensile strength but a greater degree of toughness. This has been fully demonstrated by General Rodman in the manufacture of his incomparable guns, which are unequalled by any other made in any part of the world.

To insure good wheels the tenacity should never be less than thirty thousand pounds to the square inch, and this without the iron being too high, so as to endanger brittleness. If an inspector would require this tenacity we would seldom hear of broken wheels. Car wheels, like carriage wheels, will wear out, and good wheels, if replaced in time, will generally insure against accidents. The same may be said of car axles. Hammered axles are better than rolled axles, and yet rolled axles are coming into general use because they can be made cheaper. Let us have Government Inspectors for each, and greater safety will be the result.

Cold-blast charcoal iron is best for both car wheels and axles, and yet but little is used by the manufacturers of car wheels. Many of the manufacturers of wheels are interested in furnaces which are hot blast because the yield is greater with hot than with cold blast.

Charcoal iron remelted in reverberatory furnaces, if not permitted to become too high, will not deteriorate in quality, but Nos. 1 and 2 pig will improve in strength till it reaches No. 3, after which it deteriorates.

Some car-wheel manufacturers mix anthracite iron with charcoal iron in their wheels. Anthracite iron is usually much poorer in quality, and never uniform, and the practice should be discountenanced and condemned.

Castings from reverberatory furnaces are always superior in strength and toughness to those made from cupolas, and machinery castings, chilled or sand rolls, and car, wheels, should only be made from iron remelted in reverberatory furnaces. MULHOLLAN.

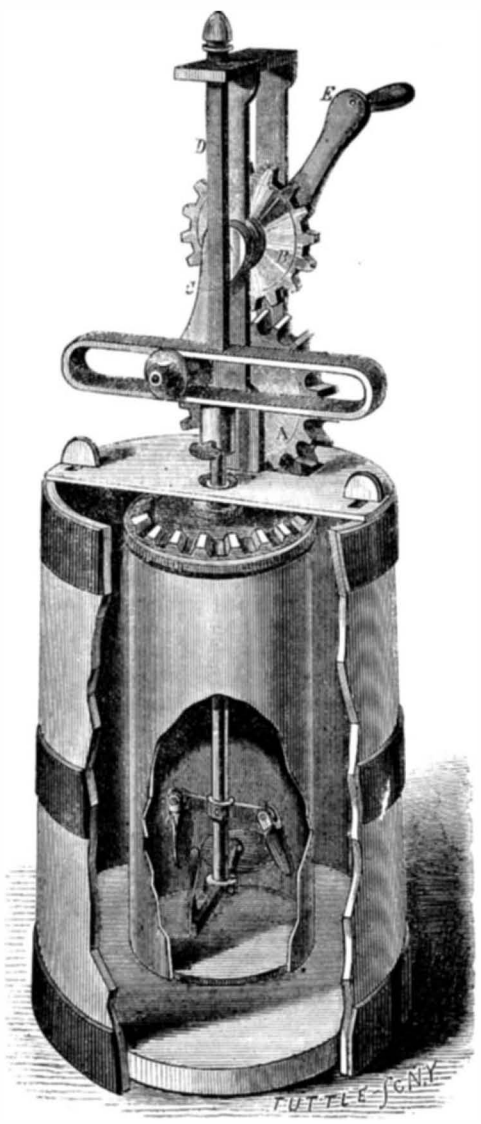
[Mr. H. C. Luce, of Jersey City, N. J., has addressed to *Engineering* a temperate, matter-of-fact statement of the case of the American car wheel, neither claiming nor admitting more than is reasonable. He says that the best American wheels sometimes break, and sometimes wear out in a few months; and yet, if made from good iron and treated properly, are the best wheels in use. He puts down the average wear under large business, at two years in passenger traffic and from three to seven years in freight. It is estimated that 25 per cent of the best wheels will fail in the first year in one way or another: the remainder will run for very various periods beyond the above average; sometimes as high as fifteen years. —EDS.

Proscription of Merit.

The only point upon which the English railway managers stood out against the demands of their locomotive hands, appears to have been that of uniformity of wages and uniformity of promotion. The motive to this demand is obvious. The meritorious hands to whom more than average wages or promotion had been accorded were of course a minority. The others could conceive of no reason but favoritism for any one being preferred above themselves, and being the majority were able to vote as the sense of the Union that all discriminations would be in practice controlled by favoritism, and ought to be abolished; so that long and faithful service, skill, care and courage should be qualities henceforth of no use to the possessor, but a free gift to the employers and the public. The obvious interest of the payers of wages would be potent enough to secure a valuable equivalent for extra pay in general, although favoritism might sometimes succeed in defeating that object; and a system of merit records to determine promotion and exclude favoritism might easily be arranged if the argument were sincere. But so long as excellence *is* excellence—*i. e.*, the exception and not the rule—for first-rate men in any craft to submit themselves to the dictation of a majority in trade matters, is equivalent to surrendering their well-earned rank and its just rewards to the envy of their inferiors. Wherever merit "wont pay," universal deterioration and loss of prosperity must follow, and the last state of that craft will be worse than the first. It ought to be a fundamental and unalterable part of the constitution of every trade association, for their own permanent advantage, that no check shall be imposed upon individual promotion or pay.

LIPP'S ICE CREAM FREEZER.

The process of procuring that delicious compound for summer weather, known so favorably as ice cream, is sufficiently familiar to all. It is merely the thorough and even freezing of eggs, milk, and sugar, so that the mass shall be of the same consistency, without lumps and perfectly homogeneous. On the even freezing of the mixture much of the delicacy of flavor and satisfactory results depend. We have known good ice cream produced by simply turning an ordinary covered



tin pail filled with the sweetened compound in a freezing mixture of ice and salt in a common tub, but it was a labor requiring time, elbow grease, and patience. We give an engraving of a machine intended to shorten the time, reduce the amount of labor, and secure superior results.

In this machine the ordinary shaped ice receptacle is used, inside of which is a can which rests and turns upon a stud and step, one on the can bottom and the other on the ice tank. By means of a bevel gear which forms the top of the cream can, to which it is secured by a simple clamp, the can is rotated by a crank on the horizontal shaft which carries the gear, A, that meshes into that on the top of the can. The upper gear, B, also engages with A and gives motion, when so engaged, to the crank, C, and by a roll sliding in the horizontal loop, to the dasher shaft, by means of the guide, D, in a reciprocating, vertical movement. This dasher shaft has two arms, the lower one carrying a fixed curved scraper and a curved disk pivoted to the cross bar, while the upper one has two spoon shaped scrapers which assist in removing the frozen cream from the inner circumference of the can and throwing it toward the center. The times of motion between the revolving cream can and the upward and downward movement of the dasher shaft with its appendages are so arranged that they are not in unison, and consequently the contents of the cream receptacle will be removed from the sides as fast as frozen and sent to the center, while that in the center, not exposed to the freezing mixture, will be thrown by the centrifugal force of the revolutions of the can to the outside. The crank, E, can be placed on either shaft to revolve the can alone, or to give the vertical reciprocating motion to the dasher shaft. For this purpose the gear, B, is made to be shifted from a feather or fixed key on its shaft to a smooth place where the turning of the shaft will not affect it. It may therefore be used to raise and lower the dasher shaft or not, as may be required, or slipped into and out of gear to suit the progress of the work.

This improvement was patented through the Scientific American Patent Agency, February 26, 1867, by Lewis A. Lipp, whom address at Coatesville, Pa.

MAGNESIUM LIGHT is introduced into the human mouth in dentistry with great advantage, enabling operations to be performed at all hours, better than by the light of day.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

The Philosophy of the Cracking of a Whip.

MESSRS. EDITORS:—In No. 16, Vol. XVI., April 20th, E. L. B. of N. Y. inquires "What is the explanation of the sound produced by the cracking of a whip." You reply, "The concussion of the lash with the air and the concussion of the air in closing up the vacuum left in the path of the lash. The sound produced by the concussion of air with air is illustrated by the whistling of a bullet."

Not so clear. Why is the report occasioned by the lash louder than the whistling of the bullet? The bullet is larger than the *end* of the lash—which produces the report. Is the vacuum or concussion less? A lash without a "cracker" *will not* make a loud report. A whipstock without a lash will produce a whistling sound.

Again, why the well known difference, if the lash has a silk thread instead of tow-string or other cracker? If the report is due solely to concussion and displacement of air, why the difference in sound produced by a lash tipped with metal and one tipped with silk thread? The metal as in the case of the bullet will make some sort of whistling sound. The cracker will make a loud report.

If you are cornered please "face the music" and let us have more light, for that is what we expect to get out of the SCIENTIFIC AMERICAN. T. M.

Allegheny City, Pa.

[The ordinary sensation of sound is dependent upon rapid movements or vibrations of the air. This motion of the air is always the result of impact or collision, either of air with air, or air with another substance. The striking of solid and liquid substances should only be considered an indirect cause of sound; for the immediate antecedent to the movement of the air is not the striking but the movement of the substances which results from it, and which movement by collision is directly communicated to the air. The ringing of a bell, therefore, may be looked on as a case of collision of a solid with air. If the cracking of a whip is not included in this theory, which is simply another way of stating our answer—we are cornered and will face the music. It may be complained by some who accept the theory that it does not sufficiently take account of the details of the case of the cracker. For such we add further explanation. The sharpness and loudness of the crack depend on the suddenness of the impact and the size of the cracker. A metal cracker, on account of its inertia, would interfere with the suddenness of the impact; its weight would act to stretch the elastic lash and so to ease off the motion. A silk cracker on the other hand has little inertia and is brought up suddenly at the greatest extension of the lash; moreover its greater bulk compared with metal or tow gives a greater volume of impact, and consequently of sound. A cracker for a given lash may be too heavy or too light, too large or two small, and for a given cracker a lash may be too long or too short, or too light or too heavy. There is a chance on this subject for a mathematician to write a book.—EDS.

A Correction.

MESSRS. EDITORS:—I have subscribed to your paper for many years, and seldom read a number without getting some new ideas to store away for future use. But do you not think you are getting careless in your replies to your correspondents, many of whom—mere tyros—esteem every opinion and rule of yours as an axiom and indisputable? In your last number you tell T. A. M., of N. J., to multiply the hight of a tank by the area, and divide by 144 when you mean 1728. Again, you tell him the area of a circle is its diameter multiplied by 3·1416 when you know that it is the "square of the radius," multiplied by that number, or more simply the square of the diameter by the fraction of 0.7854, which is the same thing. It would be absurd to accuse you of ignorance on such elementary matters, but very much harm may be done, as you well may conceive by this carelessness, especially when you take into consideration the class of your enquirers who have had little or no education.

[Our correspondent is somewhat severe, but he is perfectly correct. We do not pretend to infallibility, but we desire to be right in our replies to inquiries. In this case two answers became unaccountably and inextricably "mixed."—EDS.

Testing of Boilers.

A section of the new water tube boiler invented by Mr. J. Howard, the agricultural machine maker, of Bedford, Eng. was lately tested with a hydraulic pressure of 1200 pounds to the square inch. Every joint remained absolutely tight; yet one of the tubes was afterward disconnected and taken out in five minutes, and not over ten minutes were required for replacing it as before. *The Engineer* makes this incident the text for a discussion of the question of over-testing. It would seem that if anything could spoil a good boiler and prepare it for mischief, it might be this excessive test. It is a little like the old-fashioned hydraulic test for witches: if they floated they must be burned, if they sunk they must of course be drowned. Our contemporary opposes the usual plan of taking as a basis the maximum working pressure demanded, and calculating the proper test by multiplying it. It is recommended on the contrary, to take the calculated strength of the structure, and apply a test equal to say one third of what it ought by analogy to bear. The theoretical strength of the boiler is thus tested practically to one third of its extent: if not started by this, there is a margin of twice as much probable strength to resist any injury from the strain. Assuming the test point therefore as a safe point, the proper working pressure may be taken from that datum with any proper margin for further security.

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Hints for Inventors on Steam Condensers.

Messrs. Editors:—In the article under this caption, published Feb. 2d of this year, two important facts were presented, viz:—

(1.) That upon depriving water of the air incorporated with it—in other words, in distilling it—it is rendered incapable of ebullition, and upon converting it into steam in this condition it explodes with force.

(2.) That this explosion takes place not at the boiling point, but at 45° to 75° F. above it—generally at about 260° F., though frequently not under 300°.

Upon these data, well established by Donny, Tyndall, and other experimenters, it is assumed:—

(*a.*) Than if a condenser enforce or permit the escape of air from its vacuum, it should on the contrary provide for its impregnation with the "feed" to supply the loss and to preserve the normal status of the water.

(*b.*) That all gases, oils, etc., corrosive or explosive *per se*, or rendered such by combining with air, or each other, should be discharged, absorbed, or otherwise disposed of and disarmed.

If condensers are not constructed in subjection to the first principle (*a*) set forth, they increase the liability of boilers to burst, for they tend to exhaust the "feed" of its air, thus carrying the boiling point above its legitimate place and approximating it to that of explosion.

To illustrate: if upon trial, with the engine at rest, the pressure in the boiler is found to be only 30 lbs. to the square inch, while the temperature of the water stands above 241° F., say at 300°, the engineer should apprehend imminent danger, because it is evident that the heated liquid is nearly freed of air and may at any moment be converted into steam with destructive energy. The injection of cold water into the boiler at such a crisis would instantly precipitate the catastrophe.

In the face of these facts, every boiler, whether working with a condenser or without one, should have delicate and accurate instruments attached for registering two things, viz., the *pressure* of the contained steam and the *temperature* of the water under it. A thousand disasters charged to high pressure, unequal expansion and contraction, hot flues, gases, oil, etc., might thus be readily avoided, or traced home to their true cause.

The following table may be of use to novices or skeptics in conducting experiments in this direction entitled to confidence:—

PRESSURE AND TEMPERATURE OF STEAM.

Pressure in lbs. per sq. inch.	Corresponding temperature, F.	Pressure in lbs. per sq. inch.	Corresponding temperature, F.
15	212·8°	130	352·1°
30	251·6°	150	363·4°
45	276·4°	170	373·6°
60	295·6°	190	382·9°
75	311·2°	210	391·5°
90	324·8°	230	399·4°
110	339·2°		

From this table it may be observed that when the pressure is that of the atmosphere (15 lbs.) the temperature of the water is at about 212° F. It should however be borne in mind that these figures are not correct when the water is not quite pure. Thus if common salt be added, the boiling point, under the 15 lbs. aforesaid, ascends to 224° F.; if the liquid be saturated with nitrate of potash, it rises to 238°; if with chloride of calcium, to 264°, and so on.

Hence the importance of knowing the condition of the water used and of relieving it of impurities. Whatever carries the boiling point above its true level, under assigned pressure causes undue consumption of fuel and may provoke alarming consequences.

If condensers are not constructed in subordination to the second principle (*b*) laid down, the explosive and corrosive gases, oils, and other agents generated or introduced, may inflict serious injury by accumulation or combination and expose the boiler to convulsions or explosions. Hence full and effectual provisions should be made for ridding the vacuum of these facile and refractory elements and thus guaranteeing the purity of the feed water on the one hand and its integrity on the other.

From these considerations it would seem that inventors in this field should aim to produce condensers—

1st, Which free the steam of all obnoxious and explosive constituents, or which, by combining with each other or with air, may be rendered such.

2d, Which restore to it or the feed water the air lost from any cause, thus preserving the "feed" in a normal condition with respect to its constituents of air and water.

From these considerations it would also seem that manufacturers and others who make or use boilers or condensers should look well to their plan of construction and their system of operation, not only in contemplation of safety but of interest.

Have we boilers constructed with the *registers* noted attached?

Have we condensers built in conformity to the two principles above enunciated? Suggestor.

A Simple Plan of Determining the Ordinates of Circles.

Messrs. Editors:—A few days ago I was obliged to calculate the ordinates for a part of a circle of 500″ rad., the tangent taken as axis. By using the formula, $y = R - \sqrt{R^2 - x^2}$, I found:—

$x = 1''; 2''; 3''; 4''; 5''; 6''; 7''; 8''; 9'' \ldots$
$y = 0{\cdot}001''; 0{\cdot}004''; 0{\cdot}009''; 0{\cdot}016''; 0{\cdot}025''; 0{\cdot}036''; 0{\cdot}049''; 0{\cdot}064''; 0{\cdot}081'' \ldots$ } No. 1.

the ordinates representing in the third decimal the squares of the numbers 1, 2, 3, 4, 5....with sufficient accuracy for abscissas not exceeding 25″.

It seems to me that this fact might come very handy to draftsmen and engineers generally for drawing parts of circles of large radii, because it is very easy to keep in mind the above progression. This progression, however, enables us to find by one single division the ordinates for circles of 4, 5, 10, 25, 50, 100, 125, and 250 rad., no matter whether inches, feet, or yards—abscissas and ordinates being of the same unit respectively.

Suppose the ordinates for a circle of 125′ rad. are wanted: 125 is the fourth part of 500—thus we find by dividing progression No. 1 by 4:—

$x = \frac{1}{4}'; \frac{2}{4}'; \frac{3}{4}'; 1'; 1\frac{1}{4}'; 1\frac{2}{4}'; 1\frac{3}{4}' \ldots\ldots$
$y = 0{\cdot}00025'; 0{\cdot}001'; 0{\cdot}00225'; 0{\cdot}004'; 0{\cdot}00625'; 0{\cdot}009'; 0{\cdot}01225' \ldots$ etc.

If we do not mind the trouble of a single division and following multiplication, we are able to find also the ordinates for 6, 8, 9, 12, 14, 15, 16, 18, 21, 22, 24....radius.

For instance, the ordinates for a circle of 24′ rad. would be calculated thus:—We have to calculate first the ordinates for a radius of 4′ by dividing the progression No. 1 by 125 (or multiplying it by $\frac{8}{1000} = 0{\cdot}008$:—

$x = 0{\cdot}008'; 0{\cdot}016'; 0{\cdot}024' \ldots\ldots$
$y = 0{\cdot}000048'; 0{\cdot}000032'; 0{\cdot}000072' \ldots\ldots$

If we multiply these figures by 6, the result will be the ordinates for 24′ radius:—

$x = 0{\cdot}048'; 0{\cdot}096'; 0{\cdot}144' \ldots\ldots$
$y = 0{\cdot}000048'; 0{\cdot}000192'; 0{\cdot}000432' \ldots\ldots$

It is easy to understand that we must choose the abscissas according to the scale used and the purpose the curve is drawn for. It would be sufficient in the last case (24′ rad.) to take from progression No. 1 only $x = 3'; 6'; 9'; 12'$, etc., because $x = 3'$ is the first abscissa which corresponds with an ordinate measurable by the aid of dividers.

A. Hardt, Draftsman P. & E. R. R.

Williamsport, Pa.

The Grammatical Problem.

Messrs. Editors:—It is an exceedingly rare thing to find in your paper any statement on which a question can be raised, but in your issue of March 30th, under the head of "A Grammatical Problem," you imply that the apostrophe and s in the possessive case of nouns is a contraction of the word "his." If this is so, how does the same form ('s) make also the possessive of nouns of the feminine gender, as well as the possessive plural which should be, on the same principle, a contraction of their? Does not the apostrophe denote the omission of the letter e of the old Anglo Saxon genitive case in es? The Anglo Saxon gives no authority making the possessive plural in the same way, but the English language finding a good form for the possessive singular adopts the same form for the possessive plural. The rule then for the formation of possessives becomes very simple; for the possessive singular add es to the nominative singular, which for compactness drops the e; for the possessive plural add es to the nominative plural, which for the same reason, drops the e, and to avoid the hissing sound of two s's coming together, drops also the final s. This explains why the apostrophe comes before s in the singular and after it in the plural, which has always been a puzzle to schoolboys. It also makes your ground perfectly tenable, that the s in possessive cases of nouns ending in a sibilant can be properly omitted. C. P. G.

Boston, Mass.

The Roman Numerals.

Messrs Editors:—Being a constant reader as well as subscriber to your valuable hebdomadal, I was lately very much interested in the plausible theory given by one of your correspondents concerning the derivation of the numerals now in use from those of the Arabs.

Can you enlighten me as to the origin of the Roman numerals? We can readily understand the C and the M, the initial letters of the Latin words, *centum* and *mille*, but why should V represent five, and X ten? In Worcester's Dictionary we are told that the letter V was used to designate the number 5 "perhaps from its resemblance to an outspread hand." Will Shakespeare says, "Our fathers had no other book but the score and the tally, thou hast caused printing to be used." These primitive sticks or tallies, one of which was in the hands of the creditor, the other of the debtor, were cut or notched simultaneously so that they might tally together. Now, may it not have been that when the tally among the Romans was superseded by the arts of writing and printing, that the numerals notched on the sticks, one, two, three, four, then crossed by a diagonal line to denote five, may have been supposed to bear a resemblance to the letter V? Might not the X in the same manner have been suggested by the two diagonal lines of the tally. E. M. G.

Baltimore, Md.

THE GOLDEN HEGIRA.

At the date of the discovery of America the whole amount of gold in commercial Europe was estimated at $170,000,000. During the succeeding one hundred and twelve years the opening of new fields of supply added about $6,387,500,000, so that had there been no loss nor shipments, there should have been at the commencement of the present century $6,557,500,000 in the commercial world. If to this we add the enormous receipts from California and Australia developed in late years and the continued supplies drawn from the older fields, the statement will seem incredible that instead of accumulating, the stock of gold in Europe is actually on the decrease. The inquiry then naturally arises, what becomes of the precious metal?

In a paper read before the Polytechnic Association Dr. Stephens stated that of our annual gold product, full fifteen per cent is melted down for manufactures; thirty-five per cent goes to Europe; twenty-five per cent to Cuba; fifteen per cent to Brazil; five per cent direct to China, Japan, and the Indies; leaving but five per cent for circulation in this country. Of that which goes to Cuba, the West Indies, and Brazil, full fifty per cent finds its way to Europe, where, after deducting a large per centage used in manufacturing, four fifths of the remainder is exported to India. Here the transit of the precious metal is at an end. Here the supply, however vast, is absorbed and never returns to the civilized world.

The Orientals consume but little, while their productions have ever been in demand among the western nations. As mere recipients therefore, these nations have acquired the desire of accumulation and hoarding, a passion common alike to all classes among the Egyptians, Indians, Chinese and Persians. A French economist states that in his opinion the former nation alone hide away $20,000,000 of gold and silver annually, and the present Emperor of Morocco is reported as so addicted to this avaricious mania that he has filled seventeen large chambers with the precious metals. The passion of princes, it is not surprising that the same spirit is shared by their subjects, and it is in this predilection that we discover the solution of the problem as to the ultimate disposition of the precious metals. This absorbtion by the Eastern nations has been uninterruptedly going on since the most remote historical period. According to Pliny, $100,000,000 in gold was in his days annually exported to the East. The balance of trade in favor of these nations is now given as $80,000,000 annually.

Actual loss to the world, to a great amount, is yearly caused by sinking in the ocean, and in some of the processes employed in the arts, as plating and gilding. In concluding, an estimate concerning the actual loss of coin in circulation by abrasion may be proper. In a report made by the director of the United States mint a few years since, is given the following results of some careful and comprehensive experiments made at the mint to ascertain this loss, showing that waste of gold and silver by this cause has been generally greatly overestimated. "On our silver coins taken promiscuously the average amount of loss from abrasion was ascertained to be one part in 6·30, while the gold coins tested seperately showed an average loss on the half-eagle of one part in 3550; the double eagle one in 9000; and a careful estimate as to the proportions of the various sizes of coins actually in circulation in the United States, made of two metals, led to the conviction that the yearly loss does not exceed one part in 2,400."

Life-Saving Inventions.

The session of the Board of Commissioners, appointed under the authority of the Secretary of the Treasury, to examine into the merits of inventions of a life-saving character, seems likely to be quite a protracted one. About three hundred inventions have been registered for examination, but a small proportion of that number have as yet been put to a practical test. Having, however, now thoroughly systemized their labors, the work will be pushed forward with greater speed. All the inventions presented for examination have been ranked under the following classes:—

1. Boilers, safety valves, steam and water gages, anti-incrustators, steam pumps and siphons, hose and hose couplings, fusible alloys.

2. Life boats and rafts, detaching gear, lowering apparatus and life preservers.

3. Steering apparatus, drags, windlasses and capstans.

4. Fog signals, signal lights, devices for reefing top sails, and nautical instruments of all kinds.

Under a fifth division are classed all other life-saving inventions not specially included in either of the foregoing. The first section has been disposed of and the Board are at present engaged in testing the numerous devices of disengaging tackle.

The Commissioners consist of the following gentlemen: Joseph Cragg, Local Inspector of Steamers, district of Baltimore, Md.; Supervising Inspectors—Asaph S. Bemis, Ninth district, Buffalo, N. Y.; Alfred Guthrie, eighth district, Chicago, Ill.; J. V. Guthrie, sixth district, Louisville, Ky.; William Rogers, tenth district, New Orleans, La.; Col. Chas. L. Stephenson, fifth district, Galena, Ill.; John M. Weeks, Local Inspector, district of New York,; Capt. Wm. M. Mew, General Superintendent of Steam Inspection. A. S. Bemis, esq., is President, and M. A. Clancy, Esq., Secretary.

Coal Oil as a Lubricator.

D. W. S. of St. Louis says: "I have found after three years' use of an article styled in the market 'lubricating oil,' which costs here fifty cents per gallon, that it answers my purpose quite as well as lard oil. Our machinery runs very fast, from 1,000 to 4,000 revolutions per minute, and I find the bearings to be in a better condition than when we used lard oil. At first we were not successful in procuring a good article."

Our correspondent asks where menhaden oil can be obtained. This is not the first inquiry we have had for this oil, and the manufacturers would do well to advertise it. It is manufactured extensively on Long Island, but we cannot give the name of any party engaged in its sale.

Alloy for Hard Tools and Bells.—20 parts iron turnings or tin waste, 80 steel, 4 manganese, and 4 borax. To increase the tenacity, the proportions may be varied and two or three parts wolfram may be added.

The Trades of France are to be represented at the Exposition by delegates both male and female, elected by their constituents. Every working man and woman of Paris is to be allowed one free admission.

Production of Aniline.—By adding to nitro-benzole an acid solution of chloride of tin, a strong reaction is obtained in a few moments, great heat is evolved and aniline is produced.

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WHAT IS THE THEORY OF THE WATER POLISH?

This is a question of a correspondent, and although in our practice as a machinist we had, times without number, used water in taking the finishing chip for shafts, journals, etc., we had never considered the question. Upon inquiry of other practical men and of scientists we find the same ignorance prevailing, and, in their attempts to explain, a difference of views. These questions are valuable as leading to new improvements and discoveries. If a workman merely knows that a certain process will produce a certain result, without knowing the why and wherefore, he stands at the threshold of the temple and must ever remain in the outer court. The reason why can be found only within.

One theory presented is that the friction of the iron against the edge of the tool produces heat, however slowly the work is performed, and that the edge is therefore disintegrated and roughened which prevents it from leaving a smooth or rather a polished surface. That the only use of the water is to keep the edge of the tool cool and therefore intact. We do not accept this theory. To be sure water is sometimes used in turning iron for the purpose of keeping the cutting edge of the tool intact by preventing it from heating when a heavy chip is taken or the lathe driven rapidly. This use of water, however, is only a make-shift intended to facilitate work by saving time.

If the only use of water in turning wrought iron is to keep the tool cool, why is soapy water, or water containing a solution of carbonate of soda used in preference to clear water? They are of no lower temperature than pure water. Again, if the roughening of the edge of the tool is the cause of its not leaving a polish when used without water, this roughening must take place instantly; for every machist knows that without water he cannot leave a polished surface even in a part of one revolution.

We prefer to attribute the result of the combined action of the tool and water to lubrication. In ordinary turning the "diamond point" or "bossing tool" is used. Its action, as it is fed along while the shaft is turning, is to cut on the shaft a screw thread, differing from the ordinary screw thread only in being much finer than the thread of screws commonly used. However slow may be the lateral feed the result is a screw, if the diamond-pointed or V-shaped tool is used. Now the surface of the turned iron is a series of depressions and elevations; a longitudinal section would show serrated edges. To produce a perfect surface these projections must be removed. This is what the square-nosed finishing tool does. But this square-nosed tool, if used without water or oil, while it will leave a smooth surface, will not produce a polished one; the lubricator—water or oil—does this. The water fills the spaces between these projections on the surface of the iron and interposes between the tool and the solid surface; the finish cut merely scraping this solid surface.

That water is a lubricator cannot be denied, as it is the only lubricator that ever reaches the stern bearing of a propeller shaft, and it is used to lubricate the steps of the spindles of turbine wheels. The grease and alkali forming a diluted soap in suds or soda water is a better lubricator.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

LATHE.—H. L. Morse, New Bedford, Mass.—The object of this invention is to construct a lathe on which straight work may be turned as well as tapering and the latter as good as the former.

SELF-LOCKING APPARATUS FOR FERRY BOATS.—James L. Canham, Newark, N. J.—This invention has for its object to furnish an improved self-acting lock by means of which the boat may lock itself in the slip.

DUNG HOOK.—Jacob G. Good, Rapo, Pa.—This invention has for its object to furnish an improved hook by means of which the dung and bedding may be easily and expeditiously drawn out of stables.

MATTING.—John Michell, West Farms, N. Y.—This invention has for its object to furhish a cheap and serviceable matting to take the place of cotton and other mattings, and the coarser varieties of carpeting.

MACHINE FOR SAWING SHINGLES.—Rev. Enoch Conger, Lexington, Ohio.—This invention has for its object to furnish an improved machine by means of which one or more tapering shingles may be sawn from a block at one operation.

BLIND FASTENING.—Ebenezer B. Beecher, Westville, Conn., and Joseph G. Davis, Henry S. Frost and Anthony Davis, Watertown, Conn.—This invention has for its object to furnish a simple and convenient means by the use of which a blind or shutter may be securely locked in any desired position.

BUTTON FOR FASTENING CARRIAGE CURTAINS, ETC.—Solomon Bidwell, Bordentown, N. J.—The object of this invention is to construct a device whereby carriage curtains can be easily buttoned to the body of the carriage or to the bows of the wagon top, or to any other part of the carriage or vehicle, and whereby the curtain will be securely held in the desired place but can be easily unbuttoned again when desired.

SEED PLANTER.—E. E. Chesney, Abingdon, Ill. This invention has for its object to furnish an improved seed planter by means of which corn or other seeds may be planted accurately in check rows or in drills, as may be desired

STUMP EXTRACTOR.—M. Mellen, Richland Station, N. Y.—This invention relates to a stump extractor which will do its work with the greatest efficiency and which is so constructed that power may be applied to it on either side or on both as may be required, and which will furthermore allow of an easy adjustment of all its parts and may be conveyed easily from one place to another.

CAR COUPLING.—Narcisse Reeves, DuQnoin, Ill.—This invention has for its object to furnish an improved coupling for railroad cars which shall be self coupling and at the same time simple and strong in construction and reliable in operation.

WINDOW SASH AND BLIND FASTENER AND LOCK.—Leander Pollock, Fishkill Landing, N, Y.—This invention has for its object to furnish a convenient means for fastening and locking window sashes and blinds.

BACK REST FOR LATHES.—H. C. Berry, Wauseon, Ohio.—This invention relates to an improvement in a back rest for lathes used for wood turning and consists in a movable segment placed vertically in the lathe in place of the ordinary back rest and provided with two adjustable friction rollers which bear against the piece of timber to be turned, and hold it steady.

VENTILATOR FOR RAILROAD CARS AND BUILDINGS.—Robert C. Graves, Barnesville, Ohio.—This invention relates to an improved ventilating apparatus to be applied to railroad cars, vessels, vehicles, public halls, churches, dwelling houses, etc., and consists in a metal or other pipe running through the car, vessel, or building having funnel-shaped openings on the outside for the admission of fresh air and provided also with peculiar arrangements for directing the fresh air into a car or room, in its passage through the pipe and for the discharge of foul air.

BOTTLE STOPPER.—Robert Robinson, Brooklyn, N. Y.—This invention has for its object to furnish an improved stopper that will close the bottle securely against the escape of gas therefrom, and which shall be so constructed that the greater the pressure the closer and firmer the stopper will be secured in its place.

MACHINE FOR MIXING COMPOSITIONS.—Albartis Eagle, Trenton, N. J.—The object of this invention is to construct a machine, in which two or more ingredients can be united promiscuously into a compound. It is chiefly intended for mixing powdered slate with tar, for a roofing composition, but may be used with equal advantage for other compositions.

STALK CUTTER.—William Dexter, Augusta, Ill.—This invention relates to a machine for cutting up standing corn stalks on the field, so that they may be plowed under the soil and rendered available as a manure or fertilizer, thereby avoiding the labor and expense of cutting them by hand and transporting them from the field, or piling them up and burning them.

CLAMP FOR HOLDING ARTICLES WHILE BEING PLANED OR MILLED.—S. A. Morse, New Bedford, Mass.—This invention relates to a clamp for securing articles firmly in position while being planed or milled. The object of the invention is to obtain a device for the purpose specified which will admit of the articles being, not only clamped with facility, or very expeditiously but also in proper position relatively with the cutting tool in every instance.

ALARM LOCK FOR TILLS.—D. K. Miller, Bernville, Pa.—The object of this invention is to obtain a simple and efficient alarm lock for tills, one which may be economically manufactured and applied and be capable of having a number of changes or different combinations effected in, the arrangement of certain working parts so as to require different manipulations thereof in order to admit of the till being opened.

ATTACHMENT FOR VEHICLES.—Edward Nason, William Nason and Oliver K. Nason, Orneville, Me.—This invention relates to a draft attachment for vehicles and has for its object the ready attachment of a horse to a vehicle and ready detachment therefrom, and a strong and durable construction and arrangement of parts.

AUGUR.—Charles Boernicke, Philadelphia, Pa.—The object of this invention is to arrange an auger so that the hole bored may be gradually enlarged at the bottom, for the purpose of more securely joining two pieces of wood.

CULTIVATOR AND CORN PLANTER.—Isaac H. Chappell, Lawrence, Kansas.—This invention consists in so constructing and combining a cultivator with a corn planter that the ground may be cultivated, and at the same time corn may be planted in the most perfect manner.

MATCH SAFE.—John Roebuck, Brooklyn, N. Y.—This invention relates to a match safe of simple construction, which is arranged with a design to cheapness and simplicity, while it answers all the purposes for which it is intended. The invention consists in the arrangement and construction of a match safe, the lower part of which forms a match box and is closed by a falling lid, which is hinged in a peculiar manner. The upper part of the device is so shaped that it is capable of receiving and holding waste matches.

CATTLE PUMP.—Miles D. Wilder, Laporte, Ind.—This invention relates to a class of pumps designed for supplying cattle and horses with water, and by which they are made to pump the water which they drink from wells or reservoirs in fields or yards.

COOKING KETTLE.—Benjamin W. Dunning, Brooklyn, N. Y.—This invention relates to a simple and valuable combination of the ordinary and indispensable culinary kettles, pans, and pots used by every family, whereby all the heat is made available, the different parts being so arranged that each one may be used for itself or in combination with the rest, as may be desired.

ATTACHMENT TO SLEDS, ETC.—Philip Bourne, Williamsbridge, N. Y.—This invention relates to a novel attachment to children's sleds, by which they can be readily propelled or moved over the surface of the ground.

STOVE.—Obadiah G. Kennel, Ezrah Smith, and Gardner L. Morrison, New York City.—This invention relates to stoves, in which gas, coal, and other oils, etc., are employed and burned.

BRIDLE.—James Harris, Kansas, Ill.—This invention consists in the combination with the bridle bit of tubes through which the cheek-straps pass. To these cheeks a pair of reins are buckled, which reins are in addition to the ordinary driving reins hung to the bit-rings.

TOOL.—Philip Weck, Brooklyn, N. Y.—This invention relates to a tool for securing the covers to cams by compressing such covers about the sides of the cams.

CAR BELL.—A. Borronman, New York City.—This invention consists in pivoting the hammer of the bell and in connecting the end or rope directly thereto.

BOOT JACK.—H. D. Boss, Williamsburgh, N. Y.—This invention consists in the use of india-rubber within and around the jaws of a boot jack, for the purpose of obviating any slip of the boot, when being pulled off the foot.

ATTACHMENT FOR STOVE PIPE.—Ira S. Bullard, Geneva, N. Y.—This invention relates to a regulator for stove pipes, whereby the draft of the stove, etc., can be more perfectly regulated or adjusted.

CORN HUSKING SHIELD.—Almon C. Robinson, Louisiana, Mo.—The object of this invention is to provide a metal shield to be worn on either thumb for protection of the hand against the rough cutting surfaces of corn husks, when they are stripped from the ear, and to expedite the work of corn husking by the more effective operation of the instrument than that of the naked hand.

GLASS CLEANER.—J. B. Dunlop, New Haven, Conn.—The object of this invention is to provide an article for cleaning glass and other substances, on the surface of which have accumulated hard stains of paint, dirt, etc. For this purpose I have a small plate of metal, such as hardened iron or steel, on the upper side of which I form a handle by which the cleaner is held. On the under surface or face of the cleaner I form flutes or V-shaped grooves, which run diagonally across its face, and form a series of knife edges thereon; between each groove is left a flat surface, in order to prevent the glass or other article from being cut or scratched. When this cleaner is brought in contact with a pane of glass on the surface, on which have accumulated stains of paint or other substance, and rubbed to and fro, a thorough cleaning thereof is accomplished.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us: besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

J. B. M., of Ind., certifies to the good effect of cold water in alleviating heart burn. He takes it in doses of about 2 oz. every 5 minutes. He has used the remedy for years and has found it infallible.

F. C., of Ind.—We have heard of castor oil for softening and preserving leather, but never tried it. We can recommend good neats-foot oil as excellent.

A. D. B., of Mass., asks: "What is the actual horse power of an engine, diam. of cylinder, 13 1-8 inches; stroke, 30 in.; revolutions per minute, 72; pressure of steam in boiler 80 lbs.; steam cut off in cylinder at half stroke." Your question does not contain all the data necessary to a correct answer. You say you have 80 lbs. in the boiler; you do not say whether you have a governor throttle between boiler and cylinder, nor give the length and size of steam and exhaust pipes. If, however, you get your boiler pressure—80 lbs.—on your piston cutting off at half stroke, the mean pressure would be be 67.4 lbs. and the gross horse power would be 99.078. The indicator is the only reliable method of determining the amount of power developed by your engine.

E. B. C., of Conn., asks if the pressure on the lower part of a steam boiler is greater or less than in the upper part, the weight of water not being considered. As we understand it, the pressure of steam is the same in every direction. Why not?

C. F. S., of N. Y., asks: "What is the rule for calculating the speed of pulleys driven by belts from larger pulleys?" We reply: As the speed of the driver is to that required for the driven, so is the diameter of the driven to that of the driver. Ex. A pulley 36 in. diameter turns 150 times per minute. Speed of the driven to be 450. Required, size of driven pulley. As 150 is one-fourth of 450, so the driven should be one-fourth the driver=9 inches, . . . The best oil we know of for valves and cylinders is good sperm or lard oil. Pure tallow is also good, as the heat of the engine keeps it in a liquid form.

C. R. C., of Pa.—In Wheatstone's and Siemen's experiments described in No. 14 Vol. VI complete magneto-electric machines were employed. The obscurity of the notice occurred from omitting to say that the armatures were combined with magnets in the usual way. The error was the fault of the foreign reports.

P. D., of C. W.—Three methods have been used for determining the quantity of steam used by an engine. 1st. Measuring the water which is put into the boiler. 2d. Using as data for calculation, the cubical capacity of the cylinder, number of revolutions and pressure of steam. 3d. The use of the indicator. The last method is the most accurate and least troublesome. But when great exactness is sought for, the three plans should be employed at the same time, in order to serve as checks against the errors of either.

J. D. H., of Minn.—"How many round balls an inch in diameter can be put into a cubical box one foot on a side?" This is a very good nut for the juveniles to crack. J. D. H. has been informed that a large prize has been offered for a solution of the problem, but we do not believe it.

J. W. L., of N. Y., supposes air to be condensed in a cylinder to half its volume by pushing down the piston half way, and another cylinder with piston same diameter, but half the length. Now let a quantity of compressed air equal to that in the first cylinder be let under the piston of the second cylinder, will it have as much effect as the compressed air of the first? Certainly.

A. C. R., of N. Y.—"Does the axis of a vertical wheel in motion impinge on the same points of its bearing that it does when in repose?" No. The tendency of the wheel in motion, is to roll up one side of the axis.

G. B. M., of Iowa.—Your cellar seems to be damp for want of ventilation. If this theory be correct, you can no doubt easily prevent the evil, by means of some simple arrangement of partitions and inlets and outlets of fresh air. The outlet might be connected with the chimney.

R. S. T., of Mass.—1. The sphere and spheroids were once common forms of the electrical machine. They are not so convenient as cylinders. 2. Leyden jars coated with the amalgam used for mirrors would operate pretty well, but it would be very difficult to make them. 3d. Substitutes for the Leyden jar are often made by coating flat glass plates. 4. A battery may be made by arranging the jars concentrically in a nest. In this case the jars of course must be wider at top, than at the bottom.

E. V. W., of Pa.—If you boil tar the more volatile portion is expelled and the residuum is pitch. The pitch or asphaltum as it is often called, of coal tar is used for roofing and as a cement.

J. P. B., of M.—The ordinary oil paint seems to be in most common use for marking by the stencil plate. All colors of paint work well. Any water solution or mixture of color and sizing, of the proper consistency also answers the purpose.

J. H., of Minn.—Rancid butter is much improved by reworking in ice cold water. The sweetening is hastened by adding to the water a small quantity of bicarbonate of soda.

A. T. B., of Mass.—We are not aware that any distinctive name has been proposed for the solids which have an elliptical base.

C. A. G.—Only the inventor or his agent can obtain information at the Patent Office concerning a case prior to the actual issue of a patent.

W. S. M., of Ohio.—1. Emery is used in grinding lenses and rouge in polishing them. 2d. The best cast steel should be used for the springs of fire arms. 3d. Paper is made sensitive to light by brushing over it solutions of salts of silver.

J. M., of N. Y.—"Which would be the easier to drag up grade 3,000 lbs. on 44x48 inch wheels or the same weight on 48x52 inch wheels. Or which will run easier up grade large or small wheels." The effect of wheels on vehicles is simply to lessen the friction of the draft, and large wheels are more efficient than small ones. The size of wheels is determined, however, mainly by the hight from the ground of the line of draft, in other words the hight of horses. In going up or down grade the same principles apply. On a grade, however, the hight of the load might be of practical importance, as the direction of the weight of load with reference to the axes of the wheels would be changed. The more direct answer to J. M.'s questions would involve more data than he has given, such as hight and habits of his horses, etc.

L. M. C., of Iowa.—There are several new processes for making artificial stone, but we have not yet learned that any of them have proved entirely satisfactory or a commercial success. The ancient process of baking clay into brick has stood the test of all ages and climes. It is scarcely to be hoped that we shall have any successful rival to brick.

A. D., of Mass.—Starch water spread on glass makes an excellent substitute for ground glass to be used in backing up stereo-transparencies.

G. H H., of Mich.—1. When heated from 32 deg. to 212 deg. zinc expands at the rate of 1 in 340, lead 1 in 351, silver 1 in 524, brass 1 in 536 copper 1 in 582, untempered steel 1 in 926. 2. The rate of expansion increases slightly at higher temperatures. 3d. It will be seen from the above figures that there is no definite relation between the specific gravity and expansibility. 4. Tubes and rods expand in length at the same rate. 5. The temper of metals affects their expansibility. 6. Address Henry Carey Baird, Philadelphia, for a treatise on watch making.

H. L. N., of Mass.—"Fill a wine glass so full of wine that another drop will make it overflow. Now you may drop into the wine as many needles as an empty glass of the same size can hold, and the wine will not overflow." Something like the above is constantly floating about in the newspapers, and it has been so often repeated that a great many people really believe it. The statement has little encouragement from science or experience. A needle or any other solid body, in proportion to its bulk, will displace the liquid in which it is immersed.

W. P. B., of Wis.—Naked wire was much used in the early days of electro-magnetism for making helices. With proper care in winding, electro-magnets so made are quite as good as others. The layers of the helix are well enough kept apart by common paper. Silk thread used for the same purpose would be no improvement. . . . . A dozen Grove's cups will give a good light by way of heating platinum wire. Fifty or more are required to give a satisfactory light from carbon points.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

R. Miller, Perth, Lanark county, C. W., wishes to communicate with manufacturers of screw and stud machinery, separately or combined.

A. Tweedy, Collinsville, Ohio, wishes to correspond with an aeronaut.

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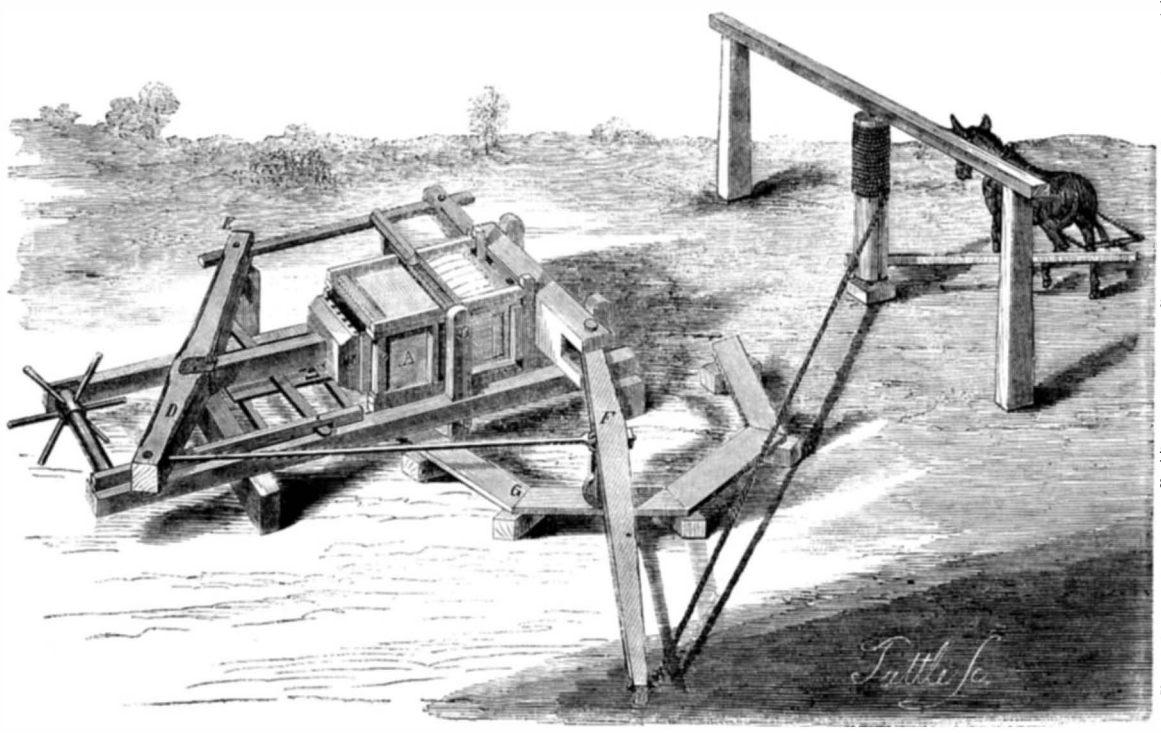
Horizontal Cotton Press.

For transportation of bulky bodies, as cotton, hay, and cloths, the work of compressing into convenient sized bales is almost imperative. Facility of handling as well as economy of room is thus assured. The screw is often used for this purpose, but it is well known that the power to be exerted increases with the resistance to be overcome, so that there is a limit to its use. The hydraulic press is costly and not always convenient to procure. The engraving represents an efficient baling press so simple in its parts and operation that it may be constructed on the plantation or farm by any one with ordinary mechanical skill. Its combination of levers gives it immense power and its operation is certain.

A suitable frame of timber is secured to the ground or the floor of a building, upon which is mounted a box, A, by being pivoted by a cross brace to the uprights, B, to allow it to take a horizontal or nearly perpendicular position. In the back end of this box, when in a horizontal position, enters a follower, C, which nearly fills its cross section. This is connected by a pivoted bar to the lever beam, D, pivoted to an upright standard at E, and connected by a bar to the traversing lever, F. This lever's weight is sustained by a roller which moves over the segmental platform, G. At the extreme end of the lever is a rope connected by a hook, and winding on an upright windlass or capstan, which may be turned either by manual labor or horse power.



WILLIAMS' HORIZONTAL COTTON PRESS.

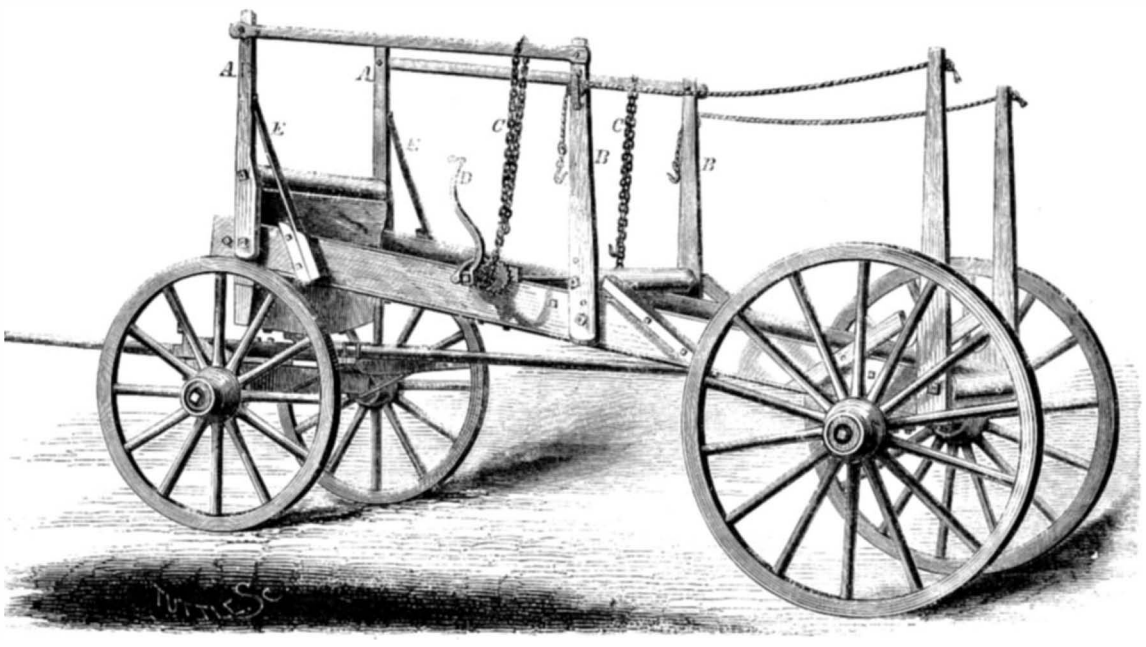
In operation, the box, A, is turned into a nearly perpendicular position and the hay or cotton pressed in until full; it is then swung into a horizontal position and the follower, C, inserted and brought home by the leverage. That portion of the box, A which holds the bale has a hinged top and bottom, the former seen open in the engraving, for convenience in roping or strapping the bale and for delivering it when finished. The windlass on the rear of the machine is for "tumbling" the box, A, which is done by a cord attached to the box and winding on the windlass beam. The top and bottom of the receiver are held in place, when closed, by a double swivel latch and the box is secured when in a horizontal or vertical position by a suitable catch. This apparatus was patented through the Scientific American Patent Agency, Oct. 2, 1866, by John I. Williams of Meridian, Miss.

Comstock's Lumber Wagon Rack.

When drawing lumber on wagons for short distances the labor of loading and unloading takes more time than to convey the load. Two men are necessary to load and to unload; one must be on the team and one on the ground. The employment of a roller near the driver's seat and one at the rear of the wagon at different elevations to give the load a backward incline is often used, but the binding of the load, its unbinding, and discharge still required considerable time and labor.

In the rack represented in the engraving the body of the wagon is inclined by means of bolsters of differing hights, that on the forward end being the highest. The upright stakes are pivoted to the sides of the frame and in them turn the pivots of the rollers. The uprights, A and B, are connected together by pivoted bars at their top so that they move in unison, and the rear uprights may be connected to B by lines which pass over pulleys on B, or through staples, and from these they can be attached to the chains, C, which are intended to be wound up on the shaft forward of the stakes, B, which shaft is turned by the crank, D, and held in position by the ratchet and pawl seen in the engraving. By a forward movement of the uprights, A and B, and backward of the rear stakes the rollers are lifted from the bolsters and allowed to turn free, which assists in the process of loading. This position of the stakes and rollers is assured by hooking the hooks of the lines into the chains, C, and turning the crank, D. This compels the rollers to bear the weight of the load. The diagonally affixed pieces on the sides of the wagon near the middle and rear uprights, prevent them from moving back too far when the rollers are raised. The pivots of the stakes, A and B, are in the rear of those of their respective rollers, and those of the rear stakes are forward of those of that roller. This gives an eccentric motion which insures the raising of the rollers and also their easy seating on the bolsters to prevent their turning.

When the rack is loaded the hooks of the ropes are disconnected from the chains, allowing the rear stakes to be forced back by the load which will bear on the rear bolster at the same time the middle and forward stakes are released, so that the remainder of the weight is taken by the middle and front bolsters, a movement which is aided by the springs, E, bearing against the forward stakes, A. The chains are then passed over the load and one of the hooks passed through a link of the other chain and secured by winding the chain by the crank which is held by the pawl and ratchet. In unloading, the chains, C, and the ropes are connected, and by turning the crank the load is supported on the rollers, which discharge it in a compact pile.



COMSTOCK'S LUMBER WAGON RACK.

By a long test with these devices it is found that half or more of the labor and time is saved than by any other method in use for loading, teaming, and unloading lumber. This improvement was patented through the Scientific American Patent Agency, February 5, 1867, by Charles C. Comstock, Grand Rapids, Mich., whom address for additional facts.

Probing Gun Shot Wounds.

From Dr. V. Gelcich of Los Angeles, Cal., we have received a communication relative to the above subject which is worthy of notice. He says that there is much difficulty in discriminating between bone and the ball by the use of the ordinary probe. His probe is simply a piece of white pine wood, made in the shape of a probe, introduced into the wound, rub, bed against the suspected object, and quickly withdrawn-when, if it has touched the ball, traces of lead will be found upon it. He says, by this simple instrument, while a medical officer in the United States Army, he saved the limbs of two men on whom amputation was about to be performed for gunshot wounds in the lower extremities; what was long supposed to be bone proving to be lead by the aid of the white pine probe.

A porcelain probe has been used to show the presence of lead in the same manner, but it is probable that a softer substance like wood is better. At least where the channel made by the ball is straight, or nearly so, and in many cases where a probe is not at hand, this, which could be extemporized from a bit of wood, would prove extremely valuable. In cases where the ball did not take a direct course it seems as though a piece of pine wood might be secured to the metallic probe and do its office in a superior manner. Dr. Gelcich offers his discovery to the attention of surgeons.

Science and Art in China.

These curious people (the Chinese) are at once remarkably knowing and ignorant. They have, for instance, as wide an acquaintance with *Materia Medica* as we, and perhaps as much knowledge of properties and effects; but they have no reasonably philosophy of treatment and next to no knowledge of pathology, physiology or anatomy. Their physicians think every pulse they find an independent manifestation; having no idea of the circulation of the blood. A physician would undoubtedly be put to death if he attempted to dissect the human body, and surgery is unknown. Prescriptions are potent according to the multitude of ingredients, often from fifty to eighty, which they stew all together and then administer. The blood of any animal is a favorite specific for deficiency in qualities that distinguish that animal. The medical art is merely a trade, in which every man keeps his knowledge and discoveries secret for his own benefit, a condition sufficient of itself to account for its backward and utterly unprogressive state.

A more amusing illustration is the deficiency of this most ingenious people in the art of music, of which they seem to have no idea, and yet they must possess abundance of musical capacity, from the fact that under the circumstances they can be taught a tune at all. A gentleman in Hong Kong is teaching a Chinese class to sing, and has succeeded in creating from it a choir for the Union Church which can sing a simple tune at sight, without error. He thus describes the state of music in the celestial regions:

"I believe this to be almost the first attempt to teach the reading of music to this wonderful people. The Chinese themselves have no tunes and no idea of music. Their instruments can only produce two or three tones, and their singing is screeching in falsetto to no kind of tune. Their voices are harsh to a painful degree, and their talent for flattening wonderful. They must never be asked to go above D, and after half an hour's singing lose all command of their voices. They also incline to bawl."

Trichiniasis.

The scavenger habits of the rat certainly render the contents of his entrails living poison to the viler animal that devours them, and thus a prolific source of trichinæ in swine. A committee of the Vienna Medical Society have made an elaborate report in which they maintain that the disease also originates in the rat; a large percentage of rats examined in different towns and countries having been found trichinized. It is also found that the germs of trichinæ may be conveyed from infected meat to other food by the larvæ of flies; which shows how a rat or other animal may become trichinized without eating either trichinized flesh or intestinescontaining germs. Prof. Brown, in a lecture before the Society for the advancement of Science and Art, in this city, stated that this parasite originates almost entirely in the swine, and is there invisible to the naked eye. When flesh containing the trichinæ is introduced into the human stomach, the flesh is dissolved and the parasite unloosed from its cell. When this occurs the parasite is about one thirtieth of an inch in length. Birth is then given to trichinæ, which straightway proceed to penetrate the whole muscular and flesh system through the alimentary canal. These young trichinæ are at first only $\frac{1}{5\,4\,0}$ of an inch in length, and resemble a worm in spiral coil. By the time they traverse the system, however, they increase in size many fold, and then begin to make felt that terrible disease to which they have given the name. As first introduced into the animal they cause trouble only by the production of their offspring. The disease is first made apparent by pains in the joints, the head, and the spine, and the patient gradually wastes away and dies. The trichinæ do not create disease by eating away the flesh —which they are not fitted to do—but by hindering or closing up the forces and processes by which health is preserved. From one of the limbs of a girl who had died in this manner lately in Springfield, Mass., a portion of muscle was detached and subjected to microscopic examination. A square inch of this disclosed from 30,000 to 80,000 trichinæ.

Welding Composition.—Fuse borax with one sixteenth its weight sal ammoniac, cool, pulverize, and mix with an equal weight of quicklime, when it is to be sprinkled on the red hot iron and the latter replaced in the fire.

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SCIENTIFIC AMERICAN.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN. S. H. WALES. A. E. BEACH.

☞ "The American News Company," Agents, 121 Nassau street, New York
☞ Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill, London England, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent on them will be promptly attended to.
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VOL. XVI., No. 18....[NEW SERIES.]....*Twenty-first Year.*

NEW YORK, SATURDAY, MAY 4, 1867.

Contents:

(Illustrated articles are marked with an asterisk,)

*Improved Switch Signal and Alarm 277
*A New Amalgamator 277
Cast Iron Boilers 277
Paris Exposition—The Chactic Stage 278
How Cast Iron is Made 278
Business and Manufacturing Items 278
Editorial Summary 279
The Tricks of the Alchemists 280
The Engineer's Alphabet 280
*Steam Boilers—Their Form, Construction, and Material 280
Gleanings from the Polytechnic Association 280
Breakage of Car Wheels—The Causes and Remedies 281
Proscription of Merit 281
*Lipp's Ice Cream Freezer 281
The Philosophy of the Cracking of a Whip 281
A Correction 281
Testing of Boilers 281
Hints for Inventors on Steam Condensers 282
A Simple Plan of Determinating the Ordinates of Circles 282
The Grammatical Problem 282
The Roman Numerals 282
The Golden Hegira 282
Life-saving Inventions 282
Coal Oil as a Lubricator 282
What is the Theory of the Water Polish? 283
Recent American and Foreign Patents 283
Answers to Correspondents 283
*Horizontal Cotton Press 284
*Comstock's Lumber Wagon Brake 284
Probing Gun Shot Wounds 284
Science and Art in China 284
Trichinasis 284
Are Our Coal Fields Inexhaustible? 285
Phonography and Photo-Phonography 285
The Dangers of Our Artificial Lights 285
Our Street Pavements 285
American Exhibitors at the Paris Exposition 286
Extension Notices 286
Patent Claims.....286, 287, 288, 289, 290
*Fay's Roofing, Flooring, and Weather-boarding Paper 292
Tests of the Potter Rail 292
*Custer's Improved Toe Calk for Horses' Feet 292

CAUTION.

It has become necessary for us to state very distinctly that the Scientific American Patent Agency Offices are at No 37 PARK ROW, and not at No 39.

ARE OUR COAL FIELDS INEXHAUSTIBLE?

Some sneers were indulged in when, a few months ago, English *savans* debated the question of the exhaustibility of the coal fields of Great Britain, but it might be well even for us, whose area of already discovered coal is seventeen times as great as that of England, to consider the question as applied to us.

A few days ago a gentleman residing in this city informed us that the heating and cooking apparatus of his dwelling had consumed since November last—less than five months—thirty-three tuns of coal. This is no exceptional case; it can be duplicated and even exceeded in hundreds of instances. But the consumption of coal for domestic purposes is as the drop in the bucket compared with the consumption in manufactories, on railroads, and in steamships. If coal is in process of formation now the process is a very slow one. We have no atmosphere of carbonic acid, no forest of gigantic ferns and mosses, no sluggish sea, nor perpetual hot-house summer which might form a coal bed of three feet in thickness in as many weeks, while it would now, under our present circumstances, require 7,400 years to produce a deposit of equal thickness.

The coal beds of Great Britain cover an area, according to Taylor, of 11,859 square miles. Prof. Hitchcock estimates the area at 12,000; other authorities average 7,995, and Prof. Rogers calls it only 5,400. Probably, when the deductions for "faults," "trap dykes," and "worn out" territory are made, about 5,600 square miles will give the present available resources of the English coal fields. Every vertical foot will yield 1,500 tuns of coal to the acre, and 50 feet total thickness will give 75,000 tuns per acre.

Our known coal area is estimated at 206,939 square miles, of which only about 470 square miles is anthracite, yet of 22,000,000 tuns mined in 1864, 10,000,000 were anthracite. When it is considered that the amount mined represented only the current demand, or rather that which was produced for the market, and did not comprise that wasted, lost in pillars, etc., it may excite some inquiry in regard to the ultimate exhaustion of our anthracite beds. The population of the entire East, a portion of the South, and the Northwest, over 12,000,000, draw their supplies from the Pennsylvania anthracite fields, and large quantities are exported to Canada and shipped to other countries. The natural increase of the anthracite coal trade is over two and a half per cent per annum, so in 1870 the demand will be not less than 15,000,000 tuns, probably much more. Estimating an average of sixty vertical feet in thickness our anthracite fields contain 18,000,000,000 tuns, which, at the present rate of increase in demand, would entirely exhaust them in 600 years. But about one half of this is lost and wasted by our present system of mining, and should the anthracite trade ever approach the dimensions of the English coal trade, our supply would melt away in about 180 years.

Some impure anthracite is found in Massachusetts and Rhode Island, and Oregon contains a limited field of the same, but owing to superiority in quality and advantages of location, Pennsylvania will probably continue to be the source from which the nation's supplies will be mainly drawn. While the anthracite of Pennsylvania underlies only 470 square miles of her surface, her bituminous deposits have an area of 12,656 square miles, and all the great Western and the Southern coal fields hold only this hydrocarbon. This will not be used for manufacturing purposes (iron) so long as the nearly pure carbon can be obtained, and will be employed for household and other purposes only when its comparative cheapness offsets its advantages. What the hitherto unexplored regions of the country west of the Mississippi may contain in the way of a mineral fuel, can at present only be conjectured.

PHONOGRAPHY AND PHOTO-PHONOGRAPHY.

The query is not now to be raised for the first time, whether human speech may not be made to record itself. Yet it is in reality a novel question, for we have as yet but vague hints of the possibility, and scarce a hint of the process. Among these hints, the first is the perfectness and definite laws of echo. Since a screen may be erected over against a speaker which will "report" or throw back a *fac simile* of his words, as a likeness is thrown back from a camera—and that by an analogous process, only coarser, *i. e.* the vibrations of a more sensible fluid—why may not the one likeness be embodied and fixed in some way as well as the other? Why may not forces which rebound with such wonderful precision, be brought to make equally precise impressions? Why not a sensitive preparation to be fixed by rays or pulses of sound, as well as of light? If this be attainable, there is evidently no difficulty in securing the reflection of the sounds upon it, in all their perfection and with intensified force.

The difference at once strikes us, that so far as we know, the action of accoustic vibrations is purely mechanical, whereas we have lately discovered that in light there is chemical or actinic power, besides the supposed mechanical action that affects the retina. But how do we know that the sensible effects of luminous and accoustic undulations, or either of them, are of a mechanical and not chemical nature? Who knows that the eye and the ear are not both laboratories, in which a chemical operation is performed in seeing and hearing, as much as in impressing shades upon a sensitive plate? Nay, is it not most probable, that seeing and hearing are or involve chemical processes, equally with tasting and smelling, breathing and muscular action? And if so, is there not probably some means of imitating the process and fixing its results in the case of hearing as of seeing?

Again, an apparent difference between the actual and the supposed art is that the one must in some way be bridged over into the other: the latter is complex, and includes both the former and some *nexus* between them which is precisely the undiscovered element in the problem. But this is perhaps only a *prima facie* necessity, and thus the inquiry here branches off in two directions; on the one hand in quest of a point of contact between accoustic operations and visible phenomena, through which audible undulations may register their effects in visible symbols; and on the other, of a way for the accoustic impulses to be impressed upon secondary agents which shall give them back as the negative does, when properly called for and not otherwise.

If the latter were possible, a reciprocating pair of such agents, properly re-inforced in energy, could maintain the impulses and propagate copies of them *ad infinitum*, and thus the speech of an orator would be handed down to all time and all mankind exactly as it sounded from the lips. All books worth reading *verbatim* would be read to the phonograph by elocutionary experts, and thenceforth read by the phonograph to the hearing (not reading) public, who would thus be saved the labor of reading, and perhaps the art itself would go out of fashion. But it is hardly worth while to anticipate just now all that might be hatched out of such an egg as that. Less extravagantly, we may surmise that an arbitrary language of phonic symbols might be constructed in which dumb things could be made to utter a translatable echo of human speech.

There are some advantages obvious to phonography proper, compared with photography, as original questions. There is the wonderful ubiquity and uniformity of the accoustic undulations, precisely the same to an infinite number of hearers in an infinite variety of positions; whereas the undulations of light are confined to right lines of movement, and no one of them can impress more than a single objective point. There seems no more intrinsic difficulty in concentrating and intensifying the accoustic than the optical undulations, and if this were to become practicable, (by the aid, perhaps, of some imitation of the tympanum) it would follow that a system of accoustic reflectors and conductors could carry human speech not only to indefinite distances but to innumerable auditors. Practical attempts in the distant transmission of the voice are now going on in France, as our readers are aware. But leaving this aside, the fact that an accoustic wave takes effect in all directions and at all points, greatly facilitates the attempt to fix its effect. For, suppose a mechanical or chemical appliance to be invented, so delicately adapted that an individual accoustic wave would in some way make its characteristic mark. Let such sensitive points be brought into exposure and withdrawn in succession as rapid as the contractions of the stylo-glossus in speaking. Or let a surface of this character be covered with a moving protector having a single perforation which should traverse the whole in regular lines, at the proper speed. Every wave would infallibly find its proper objective point and make its mark in its proper order, and the intervals of sound between letters, words and sentences, would be shown with absolute precision by the unmarked spaces, as in print.

The sensitiveness of flames to the accoustic vibrations, on which we had experiments so interesting from Prof. Tyndall, of late, suggests the possible application of gases, incandescent or otherwise, for registering sounds in a variety of ways. Flames would be most naturally expected to register photographically; but they have also calorific, mechanical and chemical effects adaptable to the same purpose. Thus there are four distinct modes in which effects can undoubtedly be transmitted through flames from the sounds of the voice. If it be practicable to find adjustments of flame which shall respond distinctively to each vocal sound and interruption, and with corresponding rapidity, it would seem much easier to register those responses in some of the various modes that already suggest themselves.

Other conjectures might be made, but we have said enough to stimulate thought and inquiry upon the subject; and as that is all we had in view in setting out with these cursory speculations, they may be dropped at this point as well as at another.

THE DANGERS OF OUR ARTIFICIAL LIGHTS.

It is becoming a matter demanding serious inquiry and possibly legislative interference what shall be done to prevent the accidents so commonly occurring from the use of the common means for producing artificial light, or, at least, to diminish the danger. If a correct record could be presented of the catastrophes—the injuries to person and property—which have been caused by the use of gas, kerosene, camphene, and burning fluid the statistics would appal the reader.

Gas explosions are always the result of carelessness or thoughtlessness. It is probably the least dangerous agent for producing light since the relinquishment of whale and lard oil for this purpose, but the ignorance or the thoughtlessness of people make it sometimes a very dangerous substance. Confined in pipes it is perfectly safe. It cannot explode nor even burn until mixed with the oxygen of the atmosphere, and it has the valuable quality of denoting its presence when mingled with the air we breathe. In this form it is dangerous, yet when a meter or the pipes located in a vault or dark cellar leak, it is too common a practice to enter the room with a light to examine the leak, when of course an explosion takes place. This can be readily prevented by first ventilating the room through doors and windows. There can be no excuse for these accidents nor for the blowing out of a gas light leaving the pipe open for the escape of the gas, a trick usually ascribed to country visitors to cities, but not seldom performed by those who should know better. Cases of death by asphyxia in sleeping rooms from this inexcusable carelessness are not unfrequent.

Camphene and burning fluid have been largely superseded by kerosene, yet they are still used to a limited extent, the fluid being burned by a wick in the ordinary manner or used to generate a gas in the lamp itself. In whatever manner employed these mixtures of alcohol and turpentine are dangerous, as many fatal accidents have proved. We know of no method of preventing the danger attending their use, and are glad they are going out of fashion. But it may be doubted whether in exchanging them for kerosene we are not "jumping from the frying pan into the fire."

Kerosene accidents are altogether too common. It would seem that this hydro-carbon might be made at least non-explosive; that it can be made non-inflammable is impossible without destroying its light-producing qualities. But many serious and fatal accidents are continually occurring by explosions of kerosene lamps. A low distillation of the oil would easily remove the more etherial substances in its composition, which, at temperatures not excessive, generate an explosive gas. There should be some simple means of testing kerosene to detect the presence of these volatile elements. Beyond that, only care in the use of kerosene promises to avert its dangers.

It is commonly burned in glass lamps. Now glass is one of the most unreliable substances known, and if not properly annealed will sometimes, even when untouched, fall in pieces as though shattered by a blow. Very likely many of the so-called explosions of kerosene lamps occur by the fracture of the glass lamp containing the oil. An eminent chemist tells us that a few days ago a glass bottle which he had used for years, and which contained collodion, suddenly shivered into fragments while standing on a table where it had remained untouched for weeks, and a flask that he had used for distilling benzine broke in a similar manner after it was laid aside.

The practice of blowing out the light when the flame is full, by throwing the breath down the chimney is pernicious. If the wick is loose in the tube the flame may be forced into the lamp and instantly ignite the surface gas or the oil itself. A better practice is to turn the flame down to a flicker and then blow it out. Lamps of metal would seem to be preferable to those made of so treacherous a material as glass, although they are not so elegant.

It is hardly credible that manufacturers or venders of kerosene would willing deal in a dangerous article containing explosive elements, as their reputation and consequent profits depend upon the quality of the fluid, but the presence of naphtha and benzine in much of it now sold is susceptible of proof. Legislative interference, aided by science, appears to be demanded as a protection to consumers; for it cannot be expected that the people at large are to become analytical chemists in order to judge of the quality of the oil they use. Either this, or we must go back to the use of the old fashioned oil lamp, the breaking of which is attended with no more serious consequences than the formation of a grease spot.

OUR STREET PAVEMENTS.

In our issue of April 13th, we spoke somewhat in favor of the Nicolson pavement, our opinion being founded on the reports of its trial in Chicago. We have received several communications in relation to the subject, our correspondents being much gratified with our expression of opinion. A resident of this city says that the substitution of wood for stone, or the London Mc Adam for our cobble and Belgium pavements, is demanded on the score of mercy to the horse. He asserts that the number of horses permanently injured by our

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stone pavements amounts to from 30 to 50 per cent, enough, if only half true, to pay for laying new pavements of wood every three or four years. He sees no reason why our streets could not be made as easy for horses and vehicles as the Park avenues, if paved on the Nicolson plan.

Another praises the pavements of Buffalo which are of the "Medina Rattlesnake stone" which has been well tested there and in Chicago.

We do not know the peculiar advantages of the Buffalo pavements, although we have visited the city several times, but there can be no doubt but improvements can be made on the pavements of New York. It would probably cost much to transport the Medina stone to this city, while the material for the Nicolson pavement can be obtained at every lumber yard.

AMERICAN EXHIBITORS AT THE PARIS EXPOSITION.

The following list of the articles of American Manufacture contained in the sixth group of the American Department of the Exposition in Paris, embraces instruments and processes of common arts:

G. J. Wardwell, Poultney, Vt.—Stone channeling and quarrying machine.
R. C. E. Ganjot, Tamaqua, Penn.—A model of apparatus for breaking up coal; a model of machinery for lifting from mines.
J. R. Harrington, Brooklyn, N. Y.—Self-rarifying tweer for manufacturing iron in blacksmith forges, or in any fire where a blast is used.
Herman Haupt, Philadelphia, Pa.—A gang of three steam drills designed for tunneling.
Philip S. Justice, Philadelphia, Pa.—Power hammer.
Walker & Platt, New York.—Power hammer.
E. E. Myers, Springfield, Ill.—Design for a model American farmhouse.
C. H. McCormick, Chicago, Ill.—Corn-reaping machine and grass-mowing machine.
R. H. Allen & Co., New York.—One combined clipper mowing and reaping machine.
Walker A. Wood, Hoosick Falls, N. Y.—One self-delivering combined reaping machine.
Joel A. Hall, Columbus, Ohio.—Cotton chopper, garden cultivator, and drill.
A. H. Wellington, Woodstock, Vt.—Root cutter.
Oscar F. Burton, New York.—One plow made in the style of the Moline plow now in use.
John G. Perry, Kingston, R. I.—One mowing machine.
D. C. Colby, New York.—Flour sieve, coffee mill.
Joel Nourse, Boston, Mass.—Plows with changeable furrow boards for plowing sod and stubble lands; swivel plows, adapted to level lands and hillsides; expanding horse hoes with changeable teeth; Brown's hay tedder; horse hay rake; Harrington's patent seed sower and cultivator combined; Howe's patent seed sower and cultivator combined; Adams' patent farming mill and grain separator; hand hoe.
Emery & Co., Chicago, Ill.—One American hog tamer.
H. H. Munroe & Co., Rockland, Me.—Rotary harrow.
Deere & Co., Moline, Ill.—One steel plow.
A. J. Fullam, Springfield, Vt.—Machine for shearing sheep and clipping horses.
Morris, Tasker & Co., Philadelphia, Penn.—Hay-band machine.
Hall & Spear, Pittsburgh, Pa.—Iron center plow.
Silas C. Herring, New York.—Bullard's patent hay tedder.
Collins & Co., New York.—Steel plow.
J. C. Bidwell, Pittsburgh, Pa.—Comstock rotary spader, also plows.
Jacob Brinkerhoff, Auburn, N. Y.—A hand Indian-corn sheller, separator, and cleaner.
M. Alden & Son, Auburn, N. Y.—A horse hoe, for cultivating all kinds of hoed crops.
Wheeler, Melick & Co., Albany, N. Y.—Palmer's excelsior horse pitchfork.
Partridge Fork Works, New York.—Manure, spading, and hay forks, rakes, and potato diggers.
L. L. Langstroth & Sons, Oxford, Ohio.—Two improved movable comb beehives.
Williams, Wallace & Co., Syracuse, N. Y.—Johnson's Great Western self-raking reaper.
Samuel J. Wallace, Carthage, Ill.—Grain binder, self-binding and raking harvester.
John W. Free, Richmond, Ind.—Fanning mill and grain seed separator; improved shoe for grain and seed separator; improved straw cutter; grain and seed sower.
Frank Fuller, New York.—Machine for husking Indian corn.
John B. Seymour, Pittsburgh, Pa.—Cotton planter.
S. T. Bacon, Boston, Mass.—Nourse's universal plow.
Silas H. Wooldridge, Venisee, Ill.—International shovel plow.
James A. Saxton, Canton, Ohio.—Ohio reaper and mower.
Glidden & Williams, Wood's Hole, Mass.—Samples of guano.
John H. Noyes, Oneida, N. Y.—Specimens of animal traps, from the rat trap to the grizzly bear trap.
George R. Baker, St. Louis, Mo.—Dough-kneeding machine, for family use.
D. H. Goodel, Antrim, N. H.—Lightning apple-parer.
S. W. Palmer, Auburn, N. Y.—Combined clothes wringers, manglers, and ironers.
Metropolitan Washing-Machine Company, New York.—Washing and wringing machine.
D. M. Somers, Washington, D. C.—Self-acting tumbler washer.
Howard Tilden, Boston, Mass.—Bon-ton flour and sauce sifter; self-feeding tobacco cutter.
Chas. A. Harper, Rahway, N. J.—Hand flour mill.
Morris Tasker & Co., Philadelphia, Pa.—Wringing machine.
Windle & Co., New York.—Mechanical brush for sweeping carpets.
E. K. Sargeant, Boonton, N. J.—Alarm coffee boiler.
J. Ward & Co., New York.—Union washing machine; Union clothes wringer.
Joseph Sedgebeer, Painsville, Ohio.—Farm corn meal and feed grinding mill; crank hand cottage or army mill; house coffee and spice mill.
Louis Elsberg, M. D., New York.—Peat-steaming and pressing machine.
Howard Tilden, Boston, Mass.—Champion egg beater.
John Ross, Stapleton, N. Y., Conical Burr-stone mills with flour-dressing machines and mill apparatus.
Elting Bolt and Duster Company, Cincinnati, Ohio.—Bolt and duster machine.
Geo. Purrington, Jr., New York.—Carpet sweeper.
Chas. H. Hudson, New York.—Clothes washer and rinser.
Schultz & Warker, New York.—Glass fountains for mineral waters.
Joseph Dixon & Co., Jersey City, N. J.—Plumbago or melting pots, stove-polish, and other articles of plumbago.
E. A. Pond, Rutland, Vt.—One-spring-power portable gas machine.
Hicks Engine Company, New York.—Steam engines of 5, 15, and 60 horse-power.
W. D. Andrews & Bro., New York.—Oscillating steam engines.
Corliss Steam-engine Company, Providence, R. I.—One Corliss steam engine.
T. R. Pickering, New York.—One stationary and one machine engine regulator.
Joseph P. Pirsson, New York.—Seamless copper and brass tubes.
L. H. Olmsted, Stamford, Ct.—Friction clutch pulley,
Geo. Dwight, Jr., & Co., Springfield, Mass.—Steam pump.
P. H. & F. M. Roots, Connorsville, Ind.—Rotary blower.
Joseph Sheldon, New Haven, Conn.—Water-pressure regulator.
Francis S. Pease, Buffalo, N. Y.—Atmospheric and hydraulic pump for mines, oil wells, and other purposes.
Joseph Firmenich, Buffalo, N. Y.—A variety of faucets made of hard rubber and wood,
Philander Shaw, Boston, Mass.—Shaw's Union double-action air engine.
James A. Robinson, New York.—Ericsson caloric pumping engine. 15-inch cylinder.
Joel Bryant, Brooklyn, N. Y.—Bushing for ships' blocks; hand grinding mill.
E. & T. Fairbanks & Co., New York.—Scales or weighing machines of various patterns; also weights of all standards.
Junius Judson, Rochester, N. Y.—Graduating governor for steam engines.
Crosby, Butterfield & Haven, New York.—Hot-air engine one horse-power,
Thos. J. Jones, New York.—Spring for steam-piston packing.
Warren E. Hill, Brooklyn, N. Y.—Hill's patent grate-bars.
Dr. J. H. Beidler, Lincoln, Ill.—Beidler's hydro-caloric light or steam lamp.
Nathaniel Jenkins, Boston, Mass.—Valves and cocks,
Howe Scale Company, Brandon, Vt.—An assortment of scales.
Steam Syphon Company, New York.—Steam syphon pump; model of railroad water-station pump.
John B. Root, New York.—Root's trunk engine, five horse-power.
L. B. Tupper, New York.—Furnace grate bars.
H. C. Dart & Co., New York.—Twelve horse-power rotary steam engine steam pump.
Lyon & Isaacs, New York.—Self-feeding hand and power drill for drilling holes in metals, etc.
Hardy, Foulds, & Tappan, Boston, Mass.—Steam fire engine.
C. H. Harrison, San Francisco, Cal.—Steam pump.
James Cochrane, New York—Model of a method of lubricating.
Wm. Sellers & Co., Philadelphia, Pa.—Planing machines, lathes, drills, slotter, boring mills, bolt-cutters, stocks (dies, taps, and tap wrenches); Giffard injectors, with self-adjusting water supply; shafting, to drive above machinery; assorted lot of finished hangers, couplings, pullies, pillow-blocks and wall plates; also, assorted lot of pulley castings.
L. H. Olmsted, Stamford, Ct.—Self-feeding ratchet drill; spring-top oiler.
Webster & Co., New York.—Webster's patent ordinary wrench.
D. L. Harris & Co., Springfield, Mass.—One engine lathe, with improved cross feed, and Vanhorn's patent tool elevator, back gears and screw-cutting mechanism attached.
Bement & Daugherty, Philadelphia, Pa.—Screw, bolt thread, and nut-tapping machine; bolt and nut-threading machine.
American Tool and Machine Co., Boston, Mass.—Fox's screw-cutting lathe, with Nason's screw attachment.
J. R. Brown & Sharpe, Providence, R. I.—Revolving head-screw machine for manufacturers of fire-arms, sewing machines, and other light machine work; also, a universal milling machine.
A. H. Brainard, Agent, Boston, Mass.—Various sizes and styles of cast-iron vises.
Bates, Hyde & Co., Bridgewater, Mass.—Power cotton gin; hand cotton gin.
Southern Cotton-Gin Co., Bridgewater, Mass.—Saw cotton gin of 60 saws; roller cotton gin, 6-inch rolls.
H. L. Emery & Son, Albany, N. Y.—American universal cotton-gin, H. L. Emery's patent; condensers, with cleaner and delivery attachment; 1 one-horse endless railway horse-power, with speed-governor attachment.
Chas. A. Shaw, Biddeford, Me.—Six spindle steps, with spindles; card-grinding machine.
C. L. Goddard, New York.—One mestizo burring picker.
George Crompton, Worcester, Mass.—Loom for weaving woolen fancy cassimeres.
J. E. Palmer, Middletown, Ct.—Circular loom for weaving plain and twilled coverings for cords and other tubular fabrics; circular loom to weave a double twill, with two shuttle or weft threads for hose; machine for tentering and drying wide and thin fabrics.
Morris Opper, New York.—Power loom for weaving fabrics with gores or irregular surfaces, such as corsets.
A. B. Prouty, Worcester, Mass.—Card-setting machine for the manufacture of card clothing for cotton and woolen machinery.
Hall Manufacturing Company, Boston, Mass.—Bazon's improved twisting machine for laying up lines, cords, etc.
N. B. Hooper, Newark, N. J.—Hat-finishing machine, worked by power.
Bruen Manufacturing Company, New York.—An attachment for making the double loop stitch; an attachment for making the thin thread stitch for embroidery.
Lathrop Sewing-machine Company, New York.—Sewing machines in different styles, embracing the entirely new principle of working direct from two ordinary spools.
Wheeler & Wilson, New York.—Sewing and button-hole machines of various styles, with samples of work.
A. B. Howe, New York.—Sewing machines, with samples of work.
Weed Sewing-machine Company, New York.—Sewing machines adapted for family and manufacturing purposes.
Charles A. Shaw, Biddeford Me.—Foot and hand knitting machines of various styles and specimens of their work.
Howe Machine Company, New York.—Sewing machines; four styles.
Amos L. Wood, Boston, Mass.—Buttonhole and embroidery machines.
Eiskemeyer Hat-blocking Machine Company, New York.—Hat stretching and blocking machine.
Halligan & Shapter, New York.—Leather-sewing machines, with specimens of harness, boots, shoes, belting, etc.
Continental Manufacturing Company, New York.—Crank-motion shuttle sewing machine.
Joseph W. Bartlett, New York.—Sewing machines, double lock-stitch and single thread.
Henry H. Reed, Philadelphia, Pa.—American buttonhole, cording, and combined sewing machines.
Bartram & Fanton Manufacturing Company, Danbury, Conn.—Sewing and buttonhole machine.
Florence Sewing-machine Company, New York.—Reversible feed, lock stich sewing machine, with self-adjusting tension, making four distinct stitches.
Isaac W. Lamb, Rochester, N. Y.—Family knitting machines.
John J. Folsom, Winchendon, Mass.—Globe sewing machine.
Thos. J. McArthur, New York.—Sewing machine.
J. M. Sterling, Paris—Sewing and embroidery machines, and specimens of their work.
Elliptic Hook Sewing-machine Company, New York.—Sewing machines, two styles.
Chas. Houghton, Boston, Mass.—McKay sole-sewing machine.
Emile Nougarit, Newark, N. J.—Hat-pouncing machine.
Mumford, Foster & Co., Detroit, Mich.—Specimens of boot trees and lasts.
John B. Winslow, New York.—Double serpentine moulding machine.
Wright & Smith, Newark, N. J.—Scroll-sawing machine.
H. S. Jacobs, Portland, Oregon.—Wheel-dressing machine.
C. B. Rogers & Co., Norwich, Conn.—Molding machine for planing, matching, and sticking molding; iron-frame pencil machine for making lead pencils, also adapted for sash and moldings; medium tenoning machine with double copes; small power mortising machine; large foot mortising machine; patent self-oiling saw arbor; Broodworth planing and matching machine.
Fenn & Felber, St. Louis, Mo.—Zimmerman's mortising and slotting machine.
Baxter D. whitney, Winchenden, Mass.—Cylinder planing machine, two horse-power; gauge lathe, two horse-power; smoothing machine, one horse-power; Wardwell's patent saw bench, one fourth horse-power.
American Saw Company, New York.—Circular saw, with Emerson's patent movable teeth.
Warren P. Miller, San Francisco, Cal.—Adjustable teeth for saws.
Cook, Sherman & Co., Glens' Falls, N. Y.—One barrel machine.
Gegener & Weller, New York.—Patent liberty quarto medium job press.
John E. Sweet, Syracuse, N. Y.—Composing machine.
Patrick Welch, New York.—Compositor's type case; also, a machine for dressing printers' types.
Geo. B. Buell, New York.—Patent writing printing machine.
Dustin F. Mellen, New York.—Screw making machines, consisting of one heading, one threading, one shaving, and one nicking machine.
Chas. A. Warland, Pawtucket, R. I.—Potter's tile-cutting machines.
Henry Winser, Philadelphia, Pa.—Shot and shell polishing machine.
Wickersham Nail Company, Boston, Mass.—Wickersham nail machine.
Henry Smith, Salem, Mass.—A method of equalizing the power of coiled springs.
John Prentice, New York.—Cigar machine in operation.
New York Quartz Company, New York.—Emery wheels.
Hoylen & Grafiling, Dayton, Ohio.—Self-feeding tobacco cutter.
Wood Brothers, New York.—One phaeton, one buggy.
Brevet Major Gen. D. H. Rucker, Chief Quartermaster's Department of Washington, D. C.—United States Government army wagon and six sets of mule harness.
A. V. Blanchard & Co., Palmer, Mass.—Plough and shovel handles of bent wood. Photographs of machinery on which the articles were made.
John Scott, Ocalo, Fla.—One carriage wheel.
James Hall & Son, Boston, Mass.—One top buggy.
Augustus Harrington, Warsaw, N. Y.—Elastic sursingle attachment.
Chas. Stallman, Natchez, Miss.—Fine lady's saddle.
Chas. Wellman, New York.—Ladies' and gentlemen's saddles.
W. G. Creamer, New York.—Model of an English railway carriage with Creamer's safety brake attached; model or samples of automatic ventilators; samples of perforated ventilator.
B. J. La Mothe, New York.—Model of a portable house.
G. Easton, United States Consul, Bristol, England.—Model and plan of a street railway and carriage.
Andrew Foster, New York.—Graham's locomotive spring balance, designed to regulate and control the safety valves of the boilers of locomotive steam engines.
Grant's Locomotive and Machine Company, Paterson, N. J.—Passenger locomotive engine and tender complete.
Henry W. Warner, Greenfield, Mass.—Cast-iron chairs with two pieces of railroad iron.
J. L. Booth, Rochester, N. Y.—Steel-capped rail for railroads.
Star Metal Company, New York.—Star metal railway journal bearing.
Thos. S. Hall, Stamford, Ct.—Electric railroad switch alarm.
John Stephenson, New York.—First-class street railway car, constructed with top seats, adapted to the European mode.
S. E. & G. L. Morse, Harrison, N. J.—A new mode of laying and raising telegraphic cables.
A. F. Ward, Philadelphia, Pa.—A chart and pamphlet representing combinations of colors arranged in geometrical order, by which the various combinations, amounting to tens of thousands, may be readily found; designed as a universal code of signals.
Moses G. Farmer, Boston, Mass.—A thermo-electric battery.
Paul Schultze, New York.—Model of a church.
Board of Public Works, Chicago, Ill.—A drawing of the tunnel being constructed two miles under Lake Michigan.
John Johnson, Saco, Me.—Model of a steam dredging machine.
Isaac Gregg, Philadelphia, Pa.—A brick machine and specimens of brick.
Horace H. Day, New York.—Model of a new system of canals without locks, adapted for the passage of ships of any size.
Stephen Ustick, Philadelphia, Pa.—Model improved street lamp.
Broughton & Moore, New York.—Instruments and apparatus for plumbers' use.
B. S. Huntington, New York.—Lever blind fastener for windows.
Arthur Huston, Bristol, Me.—Miter box, with scale for sawing miters.
Johnson Rotary Lock Company, New York.—Locks, padlocks, door-locks, etc.
Morris, Tasker & Co., Philadelphia, Pa.—Boiler flues, tubes, valves, cocks, fire plugs, heating coils, etc.
Yale & Wirm Manufacturing Company, Shelburne Falls, Mass.—Various kinds of bank, safe-door, and other locks.
New York Quartz Company, New York.—Specimens of building stones.
Samuel Nicholson, Boston, Mass.—Model of an improvement in wooden pavement.
Wm. Webster, Rochester, N. Y.—Plans for a first-class public park; plans for the grounds of a private mansion; plans for a rural cemetery etc.
James Dana, Boston, Mass.—Faced or pressed brick.
S. T. Bacon, Boston, Mass.—Bacon's challenge lock.
S. W. Palmer, Auburn, N. Y.—An improved adjustable iron bench plane.
Gonges Ventilating Company, New York.—Atmospheric Ventilator.
Louisville Cement Co., Louisville, Ky.—Specimens of cement.
Dodds, Macneale & Urban, Cincinnati, Ohio.—Bank locks.
Henry J. Newman, Andover, Mass.—Imitation of American woods, painted in oil and distemper colors on whitewood plank.
Chapin & Wells, Chicago, Ill.—Model of a swing bridge.
H. D. J. Pratt, Washington, D. C.—Working model of propelling apparatus.
Joseph Duffy, Paterson, N. J.—Miniature sectional model of iron-clad ships.
Capt. J. M. Hudson, Brooklyn, N. Y.—Specimen of rigging for ships, having for its object the raising of the topsail yard.
J. B. Van Deusen, New York.—Model of a yacht, called Fleetwing.
Elisha P. Beckwith, New London, Ct.—Miniature fishing smack.
Fred. E. Sickles, Oak Dale, Pa.—Working model to illustrate the effect of controlling the rudders of steam vessels by power instead of by hand.
E. L. Perry, New York.—Life-saving raft for saving human life at sea.
C. L. Daboll, New London, Ct.—Daboll's fog whistle or trumpet.
Brown & Level, New York.—Life-saving tackle.
E. W. Page, New York.—Eight pairs of oars of different styles.
William Oscar Reim, M.D., Springfield, Ohio.—Hydrostatic scale for ascertaining the tonnage of freight of vessels.

EXTENSION NOTICES.

Isaac Brown, Cecilton, Md., having petitioned for the extension of a patent granted to him the 19th day of July 1853, for an improvement in Mode of Driving Saws, for seven years from the expiration of said patent, which takes place on the 19th day of July, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the first day of July next.

Enoch Hidden, New York, N. Y., having petitioned for the extension of a patent granted to him the 21st day of June, 1858, reissued Sept. 8th, 1863, and again reissued March 15th, 1864, for an improvement in Side Light for Ships, for seven years from the expiration of said patent, which takes place on the 21st day of June, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the 17th day of June next.

ISSUED FROM THE U. S. PATENT OFFICE
FOR THE WEEK ENDING APRIL 16, 1867.
Reported Officially for the Scientific American

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the followin being a schedule of fees:—

On filing each Caveat	$1
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & Co., Publishers of the Scientific American, New York.

63,779.—Mode of Uniting India Rubber with Leather.—Aaron C. Andrews, New Haven, Conn.

I claim uniting india rubber to leather or other material by forming grooves or creases in such material into which the rubber is pressed previous to vulcanizing, as and for the purpose specified.

63,780.—Saw Mill.—Asa Bee, White Oak, West Va.

First, I claim the application of the guide rollers N, or their equivalents to the stirups J, substantially as and for the purpose specified.

Second, I claim the V-shaped adjustable and reversible guide bars O, when constructed and applied substantially as and for the purposes set forth.

Third, I claim the clearers P, when constructed and applied in the manner and for the purpose explained.

Fourth, I claim the combination of the springs T T3 T5, and lever T', when constructed and operating as described to communicate motion from the saw sash to the grip iron.

Fifth, I claim the spring T3, when constructed and made ajustable in the slotted lever T1, in the manner specified for the purpose of changing the feed, as described.

Sixth, I claim a grip iron when constructed with adjustable gripping blocks V1 V2 substantially as and for the purpose specified.

Seventh, I claim the adjustment of the blocks W1 W2 by means of the arm X, and clamp Y, as and for the purpose described.

63,781.—Mold for Pipe Casting.—Henry M. Bird, Cambridgeport, Mass.

I claim the combination as well as the arrangement of two or any other suitable number of the flange finishing and core supporting flasks D, provided with masses E, of molding sand, or its equivalent with a pipe mold, A B, and its core C, the whole being substantially as and for the purpose described.

63,782.—Harness Buckle.—George S. Caldwell, Syracuse, N. Y.

I claim the combination and arrangement of the buckle as herein set forth, viz., with the toothed jaws B B, resting in the edges of the frame, and bearing upon the edges of the tug or strap by means of the pins and inclined slots I K, or equivalent as specified.

63,783.—Axle Box.—Neil Campbell, (assignor to himself and William Frazier,) Brooklyn, New York.

First, I claim the flanges a a' on the exterior of the pedestal in combination with the grooved and shouldered removable base plate C, substantially in the manner and for the purpose described.

Second, The removable base plate constructed so as to be applied as described and also with sockets to receive a tie rod and end braces D D, substantially in the manner shown and described.

Third, The combination of the brackets E', studs d d', and solid springs F, F, substantially in the manner and for the purpose described.

Fourth, The combination of the enlarged sleeves K, with a grooved face bearing block H having flanges l l, substantially as described.

Fifth, The lugs h h, collar i, and pin j, in combination, as a means for securing a removable sleeve K, to the arm of a railroad car axle, substantially as herein described.

Sixth, The box E, with brackets E', on its sides and the pedestal with semi-cylindric chambers and with a cap A, so that solid springs F F, may be employed and confined in place by means of the removable base plate C, all substantially in the manner described.

63,784.—Machine for Making Drain Water Pipes.—Chas. Collier, Charlestown, Mass.

I claim a clay cylinder or receiver B, in combination with an hydraulic cylinder operating a piston or plunger D, for ejecting the clay from the receiver in the required form for a pipe or tile substantially as described.

I also claim constructing the head or plunger D, with the piston E, of the hydraulic apparatus by means of a screw e, so that it may be moved toward and from the clay-cylinder by hand for the purpose specified.

63,785.—Paper File.—Germond Crandell, Washington. D. C.

I claim a bill and paper file made as herein described or its substantial equivalent.

63,786.—Millstone Feed.—Michael DeCamp, South Bend, Ind.

First, I claim the separator constructed and operating substantially in the manner herein described and applied in the relation substantially as shown and described to the millstone feeder and the eye of mill stones for the purpose set forth.

Second, the construction of the mouth of the separator in the manner substantially as shown and described, so that the separator is adapted to be applied to a mill and to operate substantially as described, for the purpose set forth.

Third, The arrangement of a millstone feeder and a separator in the relation to one another substantially as shown and described and for the purpose set forth.

Fourth, The raised step e e1, arranged on an inclined support and in relation to the inclined partition b, and the passage d, substantially as and for the purpose described.

63,787.—Sash Supporter.—Herman Ehle, Utica, N. Y.

I claim the employment and use of one or more rods or bars C, attached to the sash and operated substantially as described.

I also claim in combination with said roads or bars C, and sash B, the nuts or disks D, and thumb screws E, the whole being attached and operated substantially in manner described, for the purpose mentioned.

63,788.—Treshing Machine.—George Eichenseer, Waterloo, Ill.

I claim the combination of the screw bolts, a and a', substantially as and for the purpose set forth.

Second, The combination of the shaft, e, its bearing block, e2, and sliding bar, e3, the ways, e4, with the screw bar, e5, and handle nut, e6, all acting substantially as and for the purpose set forth.

Third, The combination of the pulleys, e11 and e12, for packing the driving band, D, substantially as and for the purpose set forth.

Fourth, The cutter teeth, h9, for cleansing the crevices between the flanges, h8, and the feed plate, h4, as set forth.

Fifth, The application of the drop guide plate, k5, as set forth.

Sixth, The combination of the conduits, o3, and o4, with the door, o5, substantially as and for the purposes set forth.

Seventh, The combination of a feed plate, h4, arranged for vertical adjustments, with the thresher cylinder, h2, arranged for lateral horizontal adjustment, substantially as set forth.

Eighth, The combination of the separators, k k1 k2, with the return feed plate, k3, chaff discharge plate, k4, and guide drop plate, k5, all with the air currents adjusted and directed by the vane, p4, substantially as set forth.

63,789.—Apparatus for Refining and Distilling Petroleum, etc.—John Ellis, New York City, and Edward C. Hattell, Binghamton, N. Y.

First, we claim the using of steam and superheated steam for the purpose of separating and removing the more volatile from the less volatile portions of petroleum, kerosene, benzine, naphtha and turpentine, while these fluids are in a state of spray or drops, as specified.

Second, The oil pipes, E, and K, and condensing tubes, D and I, when constructed and arranged in relation to each other, and a retort, as and for the purpose specified.

Third, The separating tank tub, or tube, in combination with an upper and under retort, for the purpose of separating the water and earthy impurities from the oil before the latter flows into the lower retort.

Fourth, The using in a retort scraps of metal wire, wire sieves, nails, turnings, or other metallic or earthen materials, or even vegetable substances, which will either form a screen or a porous mass through which oil can trickle down so as to expose a large surface of it to the action of heat.

Fifth, The using in a retort or retorts of a series of nearly or quite horizontal plates, shallow pans or shelves, which may lie concave or with edges turned up, plain or convex, perforated with from one to numerous openings, or without any openings, over which oil can flow or drop, or run from point to point, in combination with the pipe, I, and coil, K, so as to expose a very large surface to the action of steam, and to form a very large evaporating surface.

Sixth, The using an agitator in a circular or nearly circular retort, for the purpose of throwing the oil into a spray or drops, so as to expose every drop as far as possible to the direct action of heat, and allowing the oil or fluid being distilled to flow through the retort in a steady stream, but not to accumulate in any considerable quantity in the retort, substantially as represented in the drawings.

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Seventh, The condensers, A M and Q, containing internally, plates, discs, turni gs, or an agitator into which the vapor of oil and cold water are allowed to flow for the purpose of condensing the vapor, substantially as represented in the drawings and described in the specification.

Eighth, The blowing the inflowing oil into a state of spray, by a current of steam, by allowing the steam to strike the stream of oil substantially as is represented by the oil pipe, u, and the dotted steam pipe, t, in the drawings of retort, L.

63,790.—BED BOTTOM.—Daniel Fitzgerald, New York City.

I claim the bar, B, provided with holes or openings, cut directly through it from side to side, when used in combination with an elastic or other band or cord passed through said openings in the manner represented for the purpose of forming a reversible bed bar which will support the slats when either side is down, substantially as herein set forth.

63,791.—CHURN.—J. C. Gaston, Cincinnati, Ohio.

First, I claim in the dasher the inverted cup-shaped hub, E, the cavity, b, being cylindrical, and two or more series of radial arms, F, secured to the exterior of the hub, E, all constructed substantially as above described, and for the purpose specified.

Second, in combination with the lid, B, which has the enlarged central perforation, a, the guard plate, c, pendants, b, and blocks, c, arranged substantially as and for the purpose above described and set forth.

63,792.—JOINT FOR CARRIAGE TOP BRACES.—G. Gregory and F. B. Morse (assignors to themselves and W. H. Cooper), New Haven, Conn.

We claim the herein described stump joint, as an improved article of manufacture, consisting of the two parts, A and B, upon the ear of one of which is formed a stud, a, and in the other a corresponding recess, so that the said stud forms the bearing or pivot for the joint, substantially as herein set forth.

63,793.—MACHINE FOR FORMING TUBES OF SHEET METAL.—William Hall, Dubuque, Iowa.

First, I claim the grooved plates, A a, hinged together and operated as and for the purpose set forth.

Second, The slotted mandrel, F, in combination with gear wheels, C C, arranged and operating as described.

Third, In combination with the grooved plates, A a, the sliding straight-edged bar, H H, with its elevated projecting flange as operated and described,

Fourth, The sliding frame, G G, with its clamping device, b b, and wheels, d d, in combination with the inclined plane, m m, operating substantially as described and for the purpose set forth.

Fifth, The combination and arrangement of the plates, A a, mandrel, F, gear wheels, C, sliking frame, G, with its parts, b b, inclined plane, m, and sliding bar, H, with projecting flange, substantially as and for the purpose set forth.

63,794.—RAILWAY SWITCH.—John A. Heyl, Boston, Mass.

I claim the arrangement of the bars, I I', the cranked shaft, G, the connecting rods, H H', the lever, E, the toggles, F F", the connection bar, D, the whole being applied to the switch, and so as to aid in operating it in manner and under circumstances substantially as hereinbefore explained.

63,795.—TABLE CUTLERY.—Walter Hubbard, Meriden, Conn.

I claim the solid handled cast metal knife herein described, the same being a new article of manufacture.

63,796.—OX BOW PIN.—Orange D. Hunter, Terrysville, Conn.

I claim securing the bolt, e, on the plate, b, by means of the prongs, c, in combination with the drop latch, h, substantially as and for the purpose described.

63,797.—UNITING STOVE PIPES, ETC.—A. B. Hurd, Watkins, N. Y.

First, I claim uniting joints of stove pipe, by means of the projections made by the indentations, a, on one piece, being shoved longitudinally in the groove, b, of the opposite piece, and then turned into the circumferential groove, c, as shown and described.

Second, Uniting joints of pipe by means of the circumferential beads, e and n, and the narrow slits, h, when arranged for joint operation as herein described.

63,798.—MACHINE FOR FELTING OR FULLING YARN, ETC.—Moses A. Johnson, Lowell, Mass.

I claim, in combination with a cork surface, aprons, cylinders and steam rolls, and the presence of heat and moisture for felting or fulling yarns, composed of wool, fur, hair, in whole or in part, substantially as described.

63,799.—SAW-MILL DOG.—Cyrus G. Jones, Orono, Me.

First, I claim the short carriage, A, constructed substantially as shown and described, for use in front or rear of the saw, and having the two independently-moving jaws, H and I, mounted thereon in such a manner as to dog the log from above and below, substantially as herein set forth.

Second, The jaw, I, mounted on the guide rods, R, and arranged to be operated by the wheel, D, and cord, U, substantially as described.

63,800.—WINDLASS FOR WELLS.—F. H. Jones, Attica, N. Y.

I claim the loose drum, C, and windlass shaft, B, in combination with the disks, j and E, springs, Z, sleeves, D, clutch, f, winch, G, and adjusting screw, n, arranged and operating substantially in the manner and for the purpose set forth.

63,801.—PORTABLE FENCE.—James Lefeber, Wayne, Ind.

I claim the double triangle, consisting of the posts, A A, bars, E E, and cross pieces, e e, and rails, 1 2 3 4 5 6 and 7, in combination with the cross pieces, c c c c and D D, all arranged and constructed substantially as and for the purposes set forth and described.

63,802.—GAS BURNER.—R. B. Locke, New Orleans, La., and Wm. B. Ulrich, Concordia Parish, La.

First, I claim providing a gas burner, with a small secondary gas taper or burner, which is so arranged as to serve as a means for lighting the gas when admitted to the principal burner, substantially as described.

Second, In combination with a gas burner, which is provided with a smaller gas burner or taper for lighting it, we claim a cock, D, which is constructed so that it shall cut off the gas from the smaller burner when gas is admitted to the main burner, substantially as described.

Third, The divisional piece, d, or its equivalent, applied to the orifice, a, of the grooved cock, D, and constructed with gas escapes, e e, in combination with a self-lighting burner, substantially as described.

Fourth, The hood or shell, G, in combination with a self-lighting gas burner which is constructed substantially as described.

63,803.—CEMENT ROOFING.—Robert O. Lowrey, Saratoga Springs, N. Y.

I claim a plastic foundation for roofs to receive, hold, and absorb more or less of the roofing cement, constructed and applied substantially as set forth.

63,804.—FARE BOX.—William H. McLellan (assignor to St. Charles street Railroad Co.), New Orleans, La.

I claim the combination of the push arm, A, tilt door and shelf, B, tilt, C, and sliding shelf, D, when these several parts are constructed and arranged for conjoint operation as described for the purpose set forth.

63,805.—MANUFACTURE OF SHEET-IRON.—Joseph Miller, Cuba, N. Y.

I claim the improved mode of manufacturing sheet-iron, as herein shown, by raising it to a welding heat just as it is about passing between the finishing rollers, substantially as and for the purpose described.

63,806.—HAY LOADER.—Joseph Morgan, West Springfield, Mass.

I claim the attachment of a wooden grooved drum, to the inside of a wheel of a hay cart or wagon revolving upon the hub, in combination with the crane and machinery by which said drum is connected to and disconnected from the wheel automatically, the whole constructed and operating substantially in the manner as herein described.

63,807.—PENDULUM LEVELS AND SIGHTS COMBINED.—Chas. Morrill, New York City.

First, I claim the combination of a swinging frame, C, with a suitable stock, A, substantially as herein specified.

Second, The combination of the swinging frame, C, stock, A, and arms, B, substantially as herein specified.

Third, The combination of the set screw, H, with one of the arms, B, and swinging frame, C, substantially as herein specified.

Fourth, The combination of the globe-sight, E G, with the stock, A, and swinging frame, C, substantially as and for the purpose herein specified.

Fifth, The bob or pendulum, D, with the graduated swinging frame, C, when such bob is pivoted at its upper end to the upper part of said swinging frame, substantially as shown and described.

Sixth, Providing the inner surface of the swinging frame, C, with a rib, d, and constructing the lower end of the bob or pendulum conformably thereto for the purpose of allowing the bob or pendulum none but the required motion.

63,808.—COMPRESS FOR COTTON, ETC.—E. L. Morse, St. Louis, Mo.

I claim the combination of the endless screws, E', on the power shaft, E, with the screw guard sectors or wheels, C, the lifting rods, C4, and platen, D, when acting substantially as and for the purpose set forth.

63,809.—VEGETABLE SLICER.—A. M. Olds, New York City.

I claim the combination of the adjustable inclined plane, B, with the grater A, slots, D, and triangular apertures, F, when constructed and arranged substantially in the manner and for the purposes set forth.

63,810.—METHOD OF SECURING HEADS IN SEAMLESS CASKS.—Dewey Phillips, Shaftesbury, Vt., and William Reid, West Arlington, Vt.

We claim the method herein described, of putting the heads or bottoms in seamless casks or other vessels, by making the heads or bottoms of a less diameter than the inner diameter of the shells at the croze, and then compressing the ends of the shell into close contact therewith preparatory to putting on the hoops, substantially as described.

63,811.—PORTABLE FURNACE FOR BOILERS.—Daniel R Prindle, East Bethany, N. Y.

First, I claim the construction of a combined furnace and support for boilers, caldrons, or steaming vessels, of an extended horizontal base, D, on outer jacket, E, and a constructed fire box, which is formed of side plates, F F and F', substantially in the manner described.

Second, In a furnace which is adapted for supporting and heating caldrons or steaming vessels, I claim the air spaces, g g g, for protecting the fire box plates formed substantially as described.

Third, The deflectory plate, G, adapted to serve as a cover for the rear air space, g, and also as a means for directing the heated products of combustion forward around the bottom of the caldron, substantially as described.

Fourth, A heating furnace which is also adapted to serve as a firm and safe support for a caldron or steamer, constructed substantially as herein described.

63,812.—HORSE HAY FORK.—Elias Rhodes, Jr., Clyde, Ohio.

First, I claim the tubular rods or links, A B C, provided with the shanks, b, and head, F, constructed and applied as and for the purpose set forth.

Second, The arrangement of the lever arm, G, provided with the lug, h, in combination with the cross head, E, tubular links, A B C, shanks, b, and jaws, D, when the several parts are constructed and arranged as and for the purpose set forth.

63,813.—METALLIC BOBBIN.—William B. Rice, Utica, N. Y., assignor to himself, John Rice, and E. S. Munson.

First, I claim the combination of a hollow metal base, C, with a tubular metal spindle, A, constructed and united substantially as and for the purpose set forth.

Second, I claim the inverted conical shoulders formed at the base of the hollow spindle, when the said spindle is attached to the hollow metallic head, substantially as and for the purpose set forth.

63,814.—APPARATUS FOR MAKING MEDICAL PLASTERS.—Albert D. Richards, Lowell, Mass.

First, I claim the bed piece, B, when made with sunk panel and raised edge, substantially as shown and described and for the purpose set forth.

Second, The pan, C, when made with the opening having chamfered edges, in combination with the bed piece, B.

63,815.—GAS-COOKING STOVE.—George O. Sanderson, Boston, Mass.

First, I claim the combination and arrangement of the pipes, G G, with the oven, L, substantially as described and for the purpose set forth.

Second, The combination of the basins, B B', with the pot holes of the cooking stoves, substantially as described and for the purpose set forth.

Third, The combination of the short cylinders, D D, with the rear pot holes and the top of the oven, substantially as described and for the purpose set forth.

63,816.—STEAM SAFETY VALVE.—John Shaffer (assignor to Samuel Baxter), St. Louis, Mo.

I claim the arrangement of the double-seated safety valve, C, with reference to the case, D and levers, E and F, substantially as and for the purpose set forth.

63,817.—LADY'S FAN.—Francis B. Scott, Lancaster, N. Y.

I claim a lady's fan having a perforated center piece, A, with or without designs printed or formed thereon, as a new article of maufacture, substantially as described.

63,818.—WINDOW SCREW.—Francis B. Scott, Lancaster, N. Y.

I claim a window screw made of perforated card board and supported in a wood or iron frame, as a new article of manufacture, substantially as described.

63,819.—MACHINE FOR CUTTING THE WIND PASSAGES IN THE ROTARY VALVES OF CORNETS.—Lewis W. Spencer (assignor to Schribner Cornet Manufacturing Co.), New York City.

I claim the combination of the mandrel with its burr cutter, the chuck capable of being turned and held in position and provided with griping jaws, substantially such as described, and the two carriages capable of being moved at right angles, the one with the other, substantially as and for the purpose described.

63,820.—HANDLE FOR SIGNAL LANTERN.—A. N. Towne, Chicago, Ill.

I claim bending a lamp handle at or near the center at a right angle, in combination with a guard handle, or its equivalent, as and for the purpose set forth.

63,821.—PROTECTING PADS FOR INTERFERING HORSES.—A. D. Westbrook (assignor to himself, R. W. Daniels, and John Humphrey), Buffalo, N. Y.

I claim retaining a pad in place on a horse's hoof by means of a hook, J which engages with the clip, e, of the shoe, substantially as set forth.

63,822.—WOOD REAMER.—Peter Meyers, Stoutsville, Ohio, administrator of the estate of Emanuel Young, deceased.

I claim as a new article of manufacture a tapering reamer constructed substantially as set forth.

63,823.—DIE FOR SWAGING CALKS FOR HORSESHOES.—John Allen (assignor to himself and Samuel Ferry), Palmer, Mass.

I claim a toe-calk die constructed of the plates, a b c, with the grooves, d e f g, arranged and constructed substantially as and for the purpose set forth.

63,824.—PERMUTATION LOCK.—George B. Atwood, Philadelphia, Pa.

First, I claim locking the spindle, D, in a position disconnected from the bolt, F, by preventing longitudinal motion without preventing rotary motion in the said spindle by means of the disks, E E1 E2, and block, K, constructed and arranged to operate together substantially in the manner described and set forth.

Second, I claim the loose measuring ring, I, in combination with the knob, C, arranged and operating together substantially as and for the purpose described.

63,825.—PORTABLE FENCE.—John Augspurger, Trenton, Ohio.

I claim the construction of a light and portable fence in lengths or panels with one short and one long post, substantially as shown and described, to be connected in a worm or zigzag shape by means of the hooks, C C', and eyes or staples, D D', in combination with the spring, E, as set forth.

63,826.—PORTABLE FENCE.—J. Augspurger, Trenton, Ohio.

I claim the construction of a light portable fence in lengths or panels, with one short and one long post, substantially as shown and described, to be connected and secured in a worm or zigzag form by means of the prolonged and gained rails, F F', in combination with the slide, D, as shown and set forth.

63,827.—PORTABLE FENCE.—J. Augspurger, Trenton, Ohio.

First, I claim the construction of a light portable fence in lengths or panels with one short and one long post, substantially as shown and described, to be connected and secured in a worm or zigzag shape by means of the prolonged and gained ends of certain of the rails, and the notched and tongued intermediate rails, as a b.

Second, I also claim in combination with the elements of the first clause, the additional block, D, attached to the end of the supporting foot of each panel, to serve as an anchor to give the fence additional firmness.

63,828.—PORTABLE FENCE.—J. Augspurger, Trenton, Ohio.

First, I claim the construction of a light and portable fence in lengths or panels, with one short and one long post, substantially as shown and described, to rest upon the surface of the ground in a worm or zigzag shape and to be connected and secured by means of the hooks, C, staples or eyes, D, and cleats, a b, or cleat, E, and oblique gains, F, operating as shown and set forth.

Second, In combination with the elements of the preceding clause, I claim the block, H, serving as an anchor, as set forth.

63,829.—PORTABLE FENCE.—J. Augspurger, Trenton, Ohio.

I claim the construction of a light portable fence in lengths or panels having one short and one long post, substantially as shown and described, and connected and secured in a worm or zigzag form by the hooks, a, and staples, b, in combinating with the gravitating button, D, and anchor block, C, the whole operating as shown and set forth.

63,830.—CULTIVATOR.—Wm. M. Ball, Morristown, Ind.

First, I claim the arm, s, provided with screw thread and nuts, t, as described, in combination with bar, e, for the purpose herein specified.

Second, The arm, s, provided with screw thread and nuts, t, the bar, e, handle, d, standards, C C C, braces, b b b, and beam, A, when the whole are combined, arranged and operating in the manner and for the purpose substantially as herein set forth.

63,831.—MATTRESS AND LIFE-PRESERVING FLOAT.—Louis Bauhoefer, Philadelphia, Pa. Antedated April 9, 1867.

I claim, First, An air bag, C, and a mattress or cushion, D, arranged within a frame substantially as and for the purpose described.

Second, The frame, A, with its buoyant cushion, B, and detachable buoyant cushion, D, and detachable air bag, C, the whole being arranged substantially as and for the purpose set forth.

Third, The frame, A, with its detachable cushion, D, in combination with the detachable cover, c, and the strips, e e, or their equivalents, for the purpose specified.

63,832.—MACHINE FOR DISINTEGRATING AND PULPING FIBROUS MATERIAL.—J. C. Beach, Bloomfield, N. J., and J. Abbey, Orange, N. J., assignor to J. C. Beach, Bloomfield.

I claim, First, The combination of the two spiral ribbed cylinders, A A, constructed and operating together in the manner and for the purpose set forth.

Second, The flat-faced bar, p, and the adjustable boxes, t, either or both of them, when used in combination with the spiral ribbed or grooved cylinders constructed and operated as shown,

63,833.—WAGON BRAKE.—W. W. Bean, Iowaville, Iowa.

I claim the application of the key block, C, fig. 3, in combination with brake operating upon the wheels by the action of tongue bar sliding in the holes, F, made in the tongue hounds, with the frame, E, and brace bars, D D, connected with the wooden rubber, as substantially described.

63,834.—CONCUSSION FUSE FOR EXPLOSIVE SHELLS.—Wm. S. Beebe, Philadelphia, Pa.

I claim, First, So attaching an inertia fuse to the interior of a hollow projectile that while it is secure against any ordinary shock, it will be broken loose by the discharge or the cannon or mortar from which it is fired, when such fuse is so constructed and arranged that, lying loosely in the powder during the flight of the projectile, it will turn its loaded end against the wall of the cavity in the projectile and explode when the flight of such projectile is suddenly arrested or checked, substantially as above described.

Second, A percussion or frictional fuse which is constructed with a loaded head, A, terminating in a feathered tail, a, and adapted for use in spherical and other tumbling shells, substantially as described.

63,835.—BLIND FASTENING.—E. B. Beecher, Westville, Conn.; Joseph G. Davis, Henry E. Frost, and Anthony G. Davis, Watertown, Conn.

We claim, First, The combination of the grooved friction wheel or pulley, H, the two semicircular clamps or brakes, I, and the slotted cap or case, G, with each other, with the shank of the knob or handle, F, and with the shaft, E, of the gear wheel, D, substantially as herein shown and described.

Second, The shaft, E, connected to the gear wheel, D, and to the knob or handle, F, in the manner herein shown and described and for the purpose set forth.

63,836.—WOOD-TURNING LATHE.—H. C. Berry, Wauseon, Ohio.

I claim a back rest for a wood-turning lathe composed of the segment, A, in combination with the spreading bars, B B, and the friction rollers, d d, constructed and operating substantially as and for the purpose herein specified.

63,837.—BUTTON FOR FASTENING CARRIAGE CURTAINS.—Salmon Bidwell, Bordentown, N. J.

I claim the construction and arrangement of the vertically swinging triangular plate, b, pivoted in the pin, A, in such a manner that its inner point may fall by its own gravity and rest against the upper edge of the shoulder upon the pin, G, its lower point fitting over and securing the plate, D, as herein shown and described for the purpose specified.

63,838.—PLOW.—Wm. Zeller, Lebanon County, and Richard Lechner, Berks, Pa., assignors to James Wallace, Lebanon Co., Pa.

We claim the jointed rod, D D', used in combination with the beam and the handle, H, as and for the purpose specified.

63,839.—SCHOOL DESK.—James E. Blair, New Haven, Conn.

I claim a school desk cover reversible in the manner substantially as described, having one of its surfaces coated or plated as herein set forth.

63,840.—HAND CULTIVATOR.—Reinard Blum, Champaign, Ill.

I claim the arrangement of the beam, A, wheel, B, shank, C, provided with point or tooth, D, with the handles, E E, and strap, F, for forming a hand cultivator, substantially as specified.

63,841.—ATTACHMENT TO MUCILAGE BOTTLES.—Douglas Bly, Macon, Ga.

First, I claim an attachment to a mucilage bottle for clearing the brush, having such a range of motion that when lowered it rests beneath the surface of the liquid, but when raised for action it rests above the surface, as set forth.

Second, An attachment to a mucilage bottle so arranged that the clearing edge for the brush is situated below the mouth of the bottle, as specified.

Third, A device for clearing the brush of a mucilage bottle, consisting of flexible jaws, between which the brush rests, as herein set forth.

Fourth, The combination of the nibs, c, and stops, d, with the attachment, B, and bottle, A, operating substantially in the manner and for the purpose specified

Fifth, The cover, g, provided with the slits, h, for shutting over the flange of the attachment, as herein set forth.

63,842.—WOOD BORING BIT.—Charles Boernicke, Philadelphia, Pa.

I claim the combination and arrangement of the tube, A, composed of the slotted parts, e f, within which is pivoted the rod, b, provided at its lower end with the horizontal cutter, c, working through the slot near the lower end of the tube, A, its upper end bent so as to project in an inclined line through the slot in the upper part of the tube, A, its upper end bent so as to project in an inclined line through the slot in the upper part of the tube, A, and held outwardly by means of the spring, d, as herein set forth for the purpose specified.

63,843.—CAR BELL.—A. Borrowman, New York City.

I claim suspending the tongue, B, in the slotted bell, A, by means of the pin, C, passing through the upper side of the bell, and through the end, D, of the tongue, B, as herein set forth for the purpose described.

63,844.—BOOTJACK.—Henry D. Boss, Williamsburgh, N. Y.

I claim a bootjack having the inside of its jaws provided with an india-rubber bearing surface for the boot heel, inserted therein, substantially as and for the purpose specified.

63,845.—PROPELLING ATTACHMENT FOR CHILDREN'S SLEDS.—F. Philip Bourne, Williamsbridge, N. Y.

I claim the attachment of lever picks, B, to sleds, sleighs, etc., substantially as and for the purpose described.

63,846.—EXERCISING APPARATUS.—Benjamin F. Brady, New York City. Antedated April 8, 1867.

First, I claim the combination of the levers, F, with the seat, a, and with springs applied in such manner that their tension will oppose the backward movement of the said levers, substantially as herein set forth for the purpose specified.

Second, The outriggers, B, levers, F, arms, D, and springs, E, combined in relation with each other and with the box, A, and seat, a, substantially as herein set forth for the purpose specified.

63,847.—COMPOSITION FOR COATING LEATHER.—Ellison Brown, Indianapolis, Ind., assignor to himself and James B. Bell, Cincinnati, Ohio.

I claim the water-proof oil polish compounded of the ingredients named, or their chemical equivalents, in the manner and for the purpose substantially as set forth.

63,848.—ELECTRO-MAGNETIC BATTERY.—Peter Bruso, Erie, Pa., assignor to himself and Charles B. Clark, Buffalo, N. Y.

I claim the adjustable connecting arm, A, for the cups of electro-magnetic batteries consisting of the pivoted attachment, f f g, and sliding clamp for the platinum, constructed and operating substantially as set forth.

63,849.—COTTON TIE.—W. F. Buckelew, Shreveport, La.

I claim the point, A b a, in combination with the point, c, and the bend, B C, as and for the purpose set forth.

63,850.—ATTACHMENT FOR CONTROLLING DRAFT IN STOVEPIPES.—Ira S. Bullard (assignor to himself and C. H. Parker), Geneva, N. Y.

I claim the construction and arrangement upon the side of the stovepipe, A, of the circular box, B, provided upon its slotted face, C, with a semicircular graduated ring, D, and depressions, b, into which fits the pointed stud of the spring index hand, H, secured to the end of the damper spindle, G, sliding slotted plate, I, hung upon said spindle, and held in place by means of the spiral spring, b', substantially as herein shown and described for the purpose specified.

63,851.—CORN PLANTER.—John Burns, Elyria, Ohio.

I claim, First, The wheels, D, provided with the rotary cutting blades, E, in combination with conductors, O, and seed boxes, Q, when arranged and operated conjointly with the adjustable frames, A B, as and for the purpose described.

Second, The levers, J L, and links, M K, as arranged, in combination with the pole, H, and adjustable frames, A B, for the purpose and in the manner set forth.

63,852.—STRAW CUTTER.—W. W. Burson, Rockford, Ill.

I claim, First, The arrangement of the cutting knives, a a', in combination with the spiral arms, h h' of pulley, A, constructed and operating substantially as described.

Second, In a combined fuel and feed cutter, the manner of fastening the cutting knives, a a' b b', to the pulley, A, substantially as described.

Third, The arrangement of the knives, a a' b b', to the pulley, A, and the construction of the stationary cutter, c, operating substantially as and for the purpose set forth.

Fourth, The arrangement of the feed passage, I, with relation to the cutters, a c, substantially as described and operating for the purpose set forth.

Fifth, The construction of the feed rollers, d d', for the purpose of giving an intermittent feed motion, as described.

Sixth, The placing of the additional knives, b b', upon the pulley, A, and additional serrated plates, i i, upon the feed rollers, d d', substantially as described and operating for the purpose set forth.

Seventh, The combination and arrangement of the nut, F, with shaft, H, and cutter pulley, A, substantially as described and operating for the purpose set forth.

63,853.—PORTABLE FENCE.—John T. Campbell, Rockville, Ind.

I claim, First, The cross stakes, C, with the notches, b, combined with the wedge, c, and arranged for supporting the plank rails, A, in the manner herein specified.

Second, A fence constructed with the plank rails, A, and posts, B, so united by bolts and nuts, a, as to permit any required degree of inclination to be given to the rails, the posts remaining vertical thus permitting its adaptation to convertable use, substantially as and for the purpose set forth.

63,854.—HAND SEEDING MACHINE.—M. D. Cone, Port Gibson, N. Y., and A. N. Douglass, Avon, N. Y.

We claim, First, Suspending the seeding apparatus from the front of a hand barrow by which they are drawn, substantially in the manner and for the purposes shown and described.

Second, The employment or use of the revolving seed cylinder, C, when it is made to contain the supply of grain, substantially as and for the purposes set forth.

Third, Enclosing the grain cylinder, C, within the casing, B, for the purpose of concentrating the seed after leaving the distributing cylinder and conveying it to the drill through the conductor.

Fourth, The adjustable perforated band, n, in combination with the revolving seed cylinder, C, substantially as and for the purposes set forth.

63,855.—LOCKING APPARATUS FOR FERRYBOAT.—James L. Canham, Newark, N. J.

I claim, First, Pivoting the blocks, D, to the frame of the boat in such a position as to take hold of the teeth of the racks, C, and hold the boat locked, substantially as herein shown and described.

Second, The combination of the springs, F, pivoted blocks, D, chains, G, shaft, H, ratchet wheel, J, and pawl, K, with each other, substantially as herein shown and described and for the purpose set forth.

Third, Attaching racks, C, to the fenders, B, substantially as herein shown and described and for the purpose set forth.

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63,856.—MACHINE FOR STUFFING AND CURRYING LEATHER.—Frederic Carl, Charlestown, Mass.

I claim, First, The combination of the rotating cylinder, A, of the shaft, B D, and perforated cage, E, or its equivalent, as and for the purpose described.

Second, The combination of the cylinder, A, and coiled pipe, G, as and for the purpose set forth.

63,857.—EXCAVATOR.—Oliver S. Chapman, Canton, Mass.

First, I claim the shovels, E, provided with the doors, F" and f, arranged to operate as herein described.

Second, The combination of the latterally adjustable hub, h, provided with the inclines, e' and the rock shaft, c, for tightening the friction bands, b, substantially as and for the purpose set forth.

Third, The combination of the bands, U, rock shafts, c, provided with the arms or levers, d', and the block, W, when arranged to operate as and for the purpose set forth.

Fourth, Constructing the wheels with a notched flange as represented in fig. 1, for the purpose herein set forth.

Fifth, I claim constructing the machine with the extra wheels, T, of larger diameter than the wheels, G, for the purpose of running the same on ordinary railway tracks clear of obstructions, substantially as set forth.

Sixth, The compound gear wheel, consisting of the movable portion, F, having slots therein, and the disk, F, with projections to fit into said slots, with the rubber or other yielding material interposed the whole being arranged for joint operation, substantially as shown and described.

Seventh, The combination of the clutch wheel, I, constructed and arranged as described with the endless chain, H*, and sprocket, w and w' as set forth.

63,858.—PLANTER AND CULTIVATOR COMBINED.—Isaac H. Chappell, Decatur, Ill., assignor to himself and James B. Millison.

First, I claim the combination of the adjustable lever, J, with the beams, H, substantially as herein shown and described and for the purpose set orth.

Second, The combination of the beut lever, W, and cross bar, X, with each other and with the standards, T, of the plow, S, substantially as herein shown and described and for the purpose set forth.

Third, Making the seat bar, N' adjustable substantially as herein shown and described and for the purpose set forth.

Fourth, The combination of the roller shaft, G' arms, H' I, shaft, J', and arm, K' with each other and with the valve bar, F', substantially as herein shown and described and for the purpose set forth.

63,859.—SEED PLANTER.—E. E. Chesney, Abingdon, Ill.

First, I claim the combination of the gage wheels, D, and single shaft. C, with the seed boxes, B, and frame, A, of the machine, substantially as herein shown and described.

Second, Operating the shaft. C, to drop the seed by means of a hand lever, K, substantially as herein shown and described.

Third, The combination of the tongue, I, and upright bars, J, with each other and with the frame of the machine, substantially as herein shown and described and for the purpose set forth.

Fourth, The combination of the plows. H and G, with the frame of the machine, substantially as herein shown and described.

63,860.— SHINGLE MACHINE. — Enoch Conger, Lexington, Ohio.

First, In a shingle machine I claim the two saw sashes, E and F, placed one behind the other and to one of which a lateral movement is given for the purpose of giving a taper to the shingles sawed, substantially as herein shown and described.

Second, The combination of the sliding frame, H, with the saw sash, F, carriage, J, to whose under side is secured the inclined bar, L, working in the inclined groove of the cross bar, h, of the sliding frame, H, for the purpose of giving a lateral movement to the said sash, substantially as herein shown and described.

63,861.—FARM GATE.—Samuel B. Cooper (assignor to himself and Richard Tattershall), Beloit, Wis.

First, I claim broadly the revolving slotted post, B for the purpose set forth.

Second, I claim the brace. E e, and pulley, H, for the purpose specified.

Third, I claim an improved farm gate in combination with the revolving slotted post, B, brace, E and e, pulleys, H and a, gudgeons, b, cap, C, and fence post, D, as herein set forth for the purpose specified.

63,862. — FARM GATE. — William M. Crawford, Ashland, Ohio.

I claim the lever wheel, J, tongue board, P, slide, B, in combination with board, C, and block, K, substantially as shown and described for the purpose set forth.

63,863.—CORSET CLASP.—C. O. Crosby, New Haven, Conn.

I claim the loop, B, formed in the manner described, its two ends secured to the tongue, d, substantially as set forth.

63,864.—SADDLE.—John Curry, Stanford, Ky.

I claim the saddle constructed with head piece and cantle, mounted upon and secured respectively to bent plates C E, united by metallic side plates and forming a skeleton frame for the support of the suspended seat.

63,865.—CLASP FOR SKELETON SKIRTS.—Theodore D. Day, New York City.

I claim the clasp for skirts and similar articles formed with a lining to the clasps and the teeth in the manner specified.

63,866.—CLASP FOR SKELETON SKIRTS.—Theodore D. Day, New York City.

I claim the lip or lips, i, in combination with the clasps hinge, a b, formed of sheet metal in the manner and for the purpose set forth.

63,867.—CLASP FOR HOOP SKIRTS. — Adolph Delkescamp, Brooklyn, N. Y., assignor to Theodore D. Day, New York City.

I claim the button or clasp for skeleton skirts formed with the flange, 2, the raised head, 1, and the teeth, 3, as and for the purposes specified.

63,868.—STALK CUTTER.—William M. Dexter, Augusta, Ill., administrator of the Estate of John A. Dexter deceased, assignor to William A. Newton.

I claim the truck, H, applied to the tongues or poles, C D, of the frames, A E, in combination with the splinter bar, L, and double trees, M M, arranged substantially as and for the purpose set forth.

63,869.— APPARATUS FOR TANNING.— Constant J. Dumery, Paris, Francis assignor to Francis C. Cormier, New York City. Antedated April 10, 1867.

I claim, First, The receptacle C, applied outside of the boiler or heating vessel, A, and communicating therewith by means of the pipe, D E, substantially as herein set forth for the purpose specified.

Second, The agitating blades or arms, I, arranged within the receptacle, C, and in relation with the opening, d, and tube, e, substantially as herein set forth for the purpose specified.

Third, The serpentine partitions, F, arranged in the upper part of the receptacle, C, substantially as herein set forth for the purpose specified.

63,870.—GLASS CLEANER.—J. B. Dunlop, Meriden, Conn.

I claim as an improved article of manufacture, a cleaner made substantially as described.

63,871.—COOKING KETTLE.—Benjamin W. Dunning, Brooklyn, N. Y.

First, I claim the adjustable covers, g, for closing the vessels, to which they are secured, and being provided with strainers, substantially as herein shown and described.

Second, The combination with the rings, c and d, and plate, e, of the vessels, A B C and D, or any or more of them, substantially as and for the purpose herein shown and described.

63,872.—LOOM TEMPLE.—W. W. Dutcher and G. Draper, Milford, Mass.

We claim each toothed wheel as constructed with the frusto-conical eye, substantially as described.

We also claim the toothed wheels so made, and their arrangement directly on, and so as to bear on one common pin and in a carrier, substantially as specified.

We also claim our improved carrier as made with the cheek pieces extended from and combined with a single supporting plate as specified.

We also claim the arrangement of a series of toothed wheels between cheek pieces, or their equivalents, and on and so as to bear on one common pin or axis, and with each wheel inclined thereto, and provided with an eye which while resting on the pin, will allow the wheel to be freely revolved thereon and between the cheek pieces.

63,873.—MACHINE FOR MIXING ROOFING COMPOSITION AND OTHER MATERIAL.—Alburtis Eagle, Trenton, N. J.

I claim a machine for mixing compositions consisting of a combination of a hopper, D, which is provided with a slotted or reciprocating false bottom, m, and valves, h, of a cylinder, B, which is provided with stirrers, s, on shaft E, and stationary arms, u, and of a furnace, A, all made and operating substantially as and for the purposes herein shown and described.

63,874.—HINGE FOR COVERS FOR TEA KETTLES AND HOLLOW WARE.—James Easterly, Albany, N. Y.

First, I claim the slot, C, entering first radially from the opening of the kettle top, then turned laterally as at C' in combination with the stem, g, of the cover, provided with a continuously projecting ledger or flange, h, or its equivalent arranged and operating substantially as set forth.

Second, I also claim the nib, d, in combination with the recess, f, on the cover, arranged and operating in the manner and for the purpose shown and described.

63,875.—HYDRAULIC PRESS.—A. H. Emery, New York City.

First, I claim a plurality of rams arranged so as to operate consecutively upon the plateau of a press, substantially as set forth.

Second, Operating or moving the plateau of a press by means of two or more columns of water or other liquids whenever these columns of water or liquid are so arranged that the plateau is moved through a part of its stroke by one or more of the acting columns, but not all, and through the rest of its stroke by a part of or the whole of the columns so used.

Third, The arrangement of two or more concentric rams placed one within the other and inclosed within a fixed cylinder to operate upon the plateau of a press, substantially as shown and described.

Fourth, The arrangement of the supply pipe, H, with the fixed cylinder, C, and the two rams, D E, for the purpose of operating the smaller ram, E, while the larger one remains stationary, substantially as set forth.

Fifth, The arrangement of the supply pipe, H, sliding packing, I, and compress ram. D, substantially as and for the purpose set forth.

Sixth, The arrangement of the two sliding packings, F I, packing ring, G, and the compress ram, D, substantially as described.

Seventh, The two supply pipes, H K, arranged and combined with the fixed cylinder, C, packing and compress rams, E D, to operate substantially as shown and described.

Eighth, The shoulder or stop, e or O, on the packing ram, E, with the nut, Q, in the compress ram, arranged to operate substantially in the manner as and for the purpose set forth.

Ninth, The two supply pipes, H K, with the valve, S, arranged to operate in connection with the packing and compress rams, E D, substantially in the manner as and for the purpose specified.

Tenth, The levers, V V, sliding wedges, U U, and valve, S, arranged to operate in the manner substantially as and for the purpose set forth.

Eleventh, The lifters, X X, plateau, P, and compress ram, D, combined and arranged to operate substantially as and for the purpose specified.

Twelfth, The combination of the lifters, X X, compress ram, D, and levers Y, arranged to operate substantially as and for tee purpose set forth.

Thirteenth, The sliding wedges, V V, plateau, P, levers, W W Y Y, spring, f', and valve, S", combined and arranged to operate substantially as and for the purpose specified.

Fourteenth, The plateau, P, and lifters, X X, in combination with the levers, Y Y, and the springs, B', or their equivalents, arranged to operate substantially as and for the purpose set forth.

Fifteenth, The spring, B', arranged with the levers, Y Y, stops, w, and the cords, u, to operate substantially as and for the purpose specified.

Sixteenth, The lifters, X X, pawls, Y', at the ends of the lifters, X X, the recesses, i, in the compress ram, D, and the fixed rests, j j, all combined and arranged to operate substantially as and for the purpose specifidd.

Seventeenth, The arrangement of the clamp frame, D', wedge, E', and the clews or loops, e' e', substantially as and for the purpose set forth.

63,876.—BLACKING-BOX HOLDER.—William A. Field, Boston, Mass.

I claim the combination of devices constituting my improved blacking-box holder, viz., the box, A, its handle, a, cover, b, elastic block, e, and screw, f arranged substantially as specified.

63,877.—MODE OF HANGING AND GUIDING THE HARNESS IN LOOMS.—L. S. Fisher, Broadhead, Wis.

I claim, First, Hanging the harness in looms in the manner substantially as shown and described and for the purpose set forth.

Second, The adjustable guides, F, in combination with the harnesses, B B, constructed and operated in the manner as shown and described and for the purpose set forth.

63,878.—DUNG HOOK.—Jacob G. Good, Raps, Pa.

I claim an improved dung hook constructed substantially in the manner herein shown and described and for the purpose set forth.

63,879.—CONSTRUCTION OF STRAINERS.—R. I. P. Goodwin, M. D., Manchester, N. H.

I claim a strainer constructed with a flange formed as described and shown in "view c."

63,880.—VENTILATING APPARATUS FOR RAILROAD CARS.—Robert C. Graves, Barnesville, Ohio.

I claim the construction and arrangement of the supplementary outlets, E, E, having deflector, n, upon the pipe, c, whose ends are curved upward and pass out of the top of the car, and whose under side is provided with crescent-shaped openings, e e, having air guides, d d, inclined in opposite directions upon each side of the middle partition, b, as herein set forth for the purpose specified.

63,881.—HYDRO-CARBON BURNER.—Alva J. Griffin, Lowell, Mass.

I claim, First, Constructing the chambers, D E, with longitudinal ribs, B C, and lateral ribs, b b b b, perforated with orifices, substantially in the manner and for the purpose set forth.

Second, The gas chamber or retort, F, when combined with the chambers, D and E, substantially in the manner and for the purpose set forth.

Third, The coil pipe, J, or its equivalent, when arranged in combination with the gas retort, F, and chambers, D and E, substantially as and for the purpose set forth.

63,882.—DEVICE FOR CUTTING WASHERS.—Adam P. Gruger, Lancaster, Pa.

I claim the manner of constructing the sliding socket head, D, with its open knife slot, d, and single binding screw, F, to each, thereby making the knives doubly adjustable, in combination with a horizontal bar, C, united firmly with the vertical brace shaft, A. and center point, B, in the manner and for the purpose specified.

63,883.—DRIVING BELT.—M. J. Haines, Bristol, England, assignor to R. R. and J. H. Whitehead, Great Britain.

I claim, First, The construction and use of driving straps or bands composed of a number of longitudinal straps of leather, hide, or other suitable material of a width equal to the thickness of the intended strap and placed side by side and secured together in any convenient manner.

Second, The peculiar modes of fastening or securing together a number of longitudinal strips of leather with a view to forming an edge laid driving strap or band, substantially as hereinbefore described and illustrated by my drawings.

63,884.—MACHINE FOR GRINDING TOP CARDS AND THE WORKERS, STRIPPERS AND LICKER-IN CYLINDERS OF CARDING MACHINES.—Charles Hardy, Biddeford, Me.

I claim the combination as well as the arrangement of the rotary grinder and mechanisms for supporting, grinding and operating two or more top cards so as to cause them at one and the same time while being ground to have reciprocating motions in directions transverely of them and in planes tangential to the curved surface of the grinder, the whole substantially as specified.

I also claim the combination of the box, x', and its lateral adjusting mechanism with the carriage, z', and its longitudinal adjusting mechanism.

I also claim the combination of the plate, y', and its pivot, b2, with the box, X', and the carriage, Z', and their mechanisms for effecting their longitudinal and lateral adjustment, as set forth, such employment of the plate, y', and its pivot serving to enable the box to turn so as to readily adjust itself to the bearing of a card cylinder when placed within the box.

I also claim the adjustable cap, f2, and the box, x', as made and applied together, as set forth.

I also claim the combination as well as the arrangement of the grinder and its operative mechanism and mechanisms for supporting and operating one or more top cards and one or more cylindrical cards on opposite sides of such grinder in manner and for the purpose of grinding such top cards and cylindrical cards at one and the same time by such grinder, substantially as described.

I also claim in combination with each set of top card carriers and their slides, mechanism for supporting such set of carriers and moving them toward the shaft of the grinder, under circumstances and in manner substantially as herein before specified.

I also claim the combination of the rotary cleansing brush, its operative mechanism and the adjustable gage bar applied to the frame, A, and for the purpose as set forth.

63,885.—FIREPLACE.—C. Harris and P. W. Zoiner, Cincinnati, Ohio.

We claim the arrangement in a shell or case, A, open in front of the interior fire pot, B, having a grated front, C, and recessed crown, E, closed rearward and laterally and open in front, substantially as set forth.

63,886.—BRIDLE.—James Harris, Kansas, Ill.

I claim the tubes F, secured to the bit E, receiving the check straps G, having holding collars I, for the purpose described, substantially as specified.

63,887.—CAR PROPELLING-APPARATUS.—Charles T. Harvey, Tarrytown, N. Y.

First, I claim the combination of the lateral rollers E E, with the large roller B, the axis of the latter being at a right angle with the axis of the former substantially as shown.

Second, I also claim the ferrule A', composed of a conical forward part O, a frame D, and a rear part N, the several parts being connected by joints which permit of lateral motion of such parts substantially as set forth.

Third, I also claim the construction and arrangement of the ferrule A, or its body or portion that contains the anti-friction rollers in sections 1 2, substantially as set forth.

Fourth. I also claim the yielding finger or ferrule guide P, substantially as set forth.

Fifth, I also claim the combination of the hook M, connected to the part D, as shown, the conical shell N, and the conical end Q', of the rope or cable A', substantially as shown.

Sixth, I also claim the combination of the link G, connected to the part D, as shown by an universal joint, with the conical forward part O, of the ferrule, substantially as shown.

63,888.—METHOD OF PROPELLING CARS.—Charles T. Harvey, Tarrytown, N. Y.

I claim the combination of a cable driving drum A, with the stationary guides B, to control and guide a propelling cable while passing around such driving drum substantially as set forth.

Second, I also claim the twisting conducting guide E, between a driving drum and railway track or any conducting pipe or guide substantially as set forth.

Third, I also claim the construction and arrangement of a driving drum for propelling cables of two or more independent stationary guides coiled in opposite directions, substantially as set forth.

Fourth, I also claim the construction and arrangement of propelling cables with heads or ferrules whose operating faces or spurs project at right angles from the heads substantially as described.

Fifth, I also claim the sliding heads or ferrules for keeping a moving cable in proper position and preventing it from turning in its guide, substantially as set forth.

Sixth, I also claim combining with the spiral guide B, anti-friction rollers for relieving the cable of friction, substantially as described.

Seventh, I also claim the hollow pipe K, constructed and arranged for conducting a propelling cable substantially as set forth.

63,889.—HOTEL REGISTER.—Charles L. Hawes, Titusville, Pa. Antedated Jan. 17, 1867.

I claim a hotel register book with the margin of its leaves occupied by advertisements substantially as described.

63,890.—HARVESTER RAKE.—John F. Hirschy and W. M. McDonald, Wooster, Ohio.

First, We claim the attachment of the raking apparatus to an adjustable wrist on an exterior clutch wheel on an outer end of the carriage axle substantially as and for the purpose described

Second, The arrangement of the pitman C, rocking arm E, connecting rod G, and clasp H, with universal joint connections the pivotal point of the rocking arm, F, being adjustable to vary the length of throw substantially as described.

Third, The combination with the rear extension prong j, of the rake head of the curved rod L, the bearings K M, latch N, and platform guide o o, substantially as described.

63,891.—SPINNING TOPS.—Robert Hoadley, Ansonia, Conn., assignor to N. C. Stiles, S. S. Wilcox, E. N. Crocker, F O. Tucker, and W. W. Tucker, West Meriden, Conn.

I claim ballasting the thin top A B, by the addition of the extra weight D, or its equivalent distributed around the periphery at or near the zone of greatest diameter substantially as and for the purposes herein specified.

63,892.—DEVICE FOR SEAMING SHEET METAL CANS.—Robert J. Hollingsworth, Cincinnati, Ohio.

I claim the tube or form C, in combination with the solder trough F, arranged for joint operation in connection with a solderingiron H, substantially as and for the purpose specified.

63,893.—WINDOW CORNICE.—A. J. Holmes, (assignor to Wells L. Robbins) Saratoga Springs, N. J.

I claim a cornice for interior decoration or for windows, doors and similar objects constructed substantially as herein described.

63,894.—Ox-BOW PIN.—B. B. Hotchkiss, New York City.

First, I claim the hollow ends of the arms, B1 B2, arranged relatively to the main body, A, and to the trunions, b, substantially in the manner and for the purposes herein set forth.

Second, The coiled spring, c, with extended ends operating on the arms, B1 B2, b1 b2, substantially in the manner and for the purposes herein set forth.

Third, The studs, A3 A4, in combination with the spring, C, and arms, B1 B2, b1 b2, and the cheeks, A1 A2, and body, A, substantially in the manner and or the purposes herein set forth.

63,895.—MACHINE FOR RAISING A NAP UPON CLOTH.—Adrien Houget, Verviers, Belgium.

I claim in machines for raising the nap on cloth, by means of two teazling drums, the arrangement substantially as herein shown of the teazling drums, conducting and stretching rollers, and suitable gear mechanism for imparting to the cloth its move to, against, and from the said teazling drums, and also to and from the receiving basin, in the manner and for the purposes set forth.

63,896.—PRINTING PAPER.—Joseph E. Hover, Philadelphia, Penn.

I claim a printing paper, the surface of which is coated with carbonate of lime, or its equivalent, for purpose specified.

63,897.—FOLDING CHAIR.—David Howarth, Portland, Me.

I claim the cross legged chair as described, when, by means of the pivot, c, pivots, d, grooves, k k, and pins, m m, it may be folded in the manner described and set forth.

63,898.—SOAP FRAME.—Mathias H. Howel., New York City. Antedated March 27, 1867.

First, I claim the frame divided vertically and diagonally, through two corners, into two parts or halves, substantially as herein set forth, for the purpose specified.

Second, The hinged locking bars, e, and lugs, n, arranged with reference to each other, and operating to lock the two parts or halves of the frame together, substantially as herein set forth.

Third, The packing, u, within the rebate around the base or bottom, A, in combination with the diagonally divided upright portions of the frame, substantially as herein set forth, for the purpose specified.

Fourth, The diagonal trusses, w, arranged with reference to the diagonal crossed braces, h h, and with the sides of the frame, substantially as herein set forth, for the purpose specified.

63,899.—BROOM HEAD.—Barnabas Hunt, Farmland, Ind.

I claim as a new article of manufacture a broom head, consisting of a series of tubes, a, made of sheet metal, and having the central longer than the others, to receive the handle, f, as herein shown and described.

63,900.—SASH SUPPORTER.—John W. Hutchings, Bridgeport, Conn.

I claim the combination of the strip, B, and eccentric or cam lever, C, as a sash supporter, substantially as and for the purpose described.

63,901.—BRIDGE.—William James, Richmond, Va.

First, I claim the construction of the towers or supports of the bridge, with passages or flues through which the suspension rods, wires, or chains are passed, in such manner as to form extended frictional bearings for said rods, wires, or chains, substantially as described.

Second, The central drum or shaft in the tower, around which the suspension wires or rods are passed substantially as described.

Third, Forming the sides of the passages or flues on which the suspension wires rest with an extended flattened bearing surface to adapt them to receive any desired number of such wires or rods arranged side by side in the same horizontal plane, substantially as described.

Fourth, Securing the ends of the wires or rods which pass through the perforated tower at a point or points at or near the base of said tower, substantially as described.

Fifth, The tight wires, rods, or chains, forming the bottom of the bridge, and passing through the perforated tower thereof, in combination with the suspension rods or chains, substantially as described.

Sixth, The manner of applying the tight wire hand rail, whereby it is made to form an additional support to the bridge as described.

Seventh, The employment of one or more suspension rod or wires, i, intermediate between the tight wire and suspension rods or wires, h and k, substantially as described.

Eighth, The arrangement of the suspension wires, rods, or chains, i k, tight hand rail and bottom wires, g h, and vertical ties or suspenders, l, in combination with the perforated towers or supports, A, in the manner and for the purpose described.

63,902.—MEDICAL COMPOUND.—John G. Jeffrey, M.D., South New Berlin, N. Y.

I claim the improved medical compound, composed of the ingredients in substantially the proportions herein specified.

63,903.—COFFEE POT.—George Jones, Saugerties, N. Y.

First, I claim in combination with the space, E, formed, constructed, and arranged substantially as specified, the tube space or passage, f, substantially as and for the purpose specified.

Second, In combination with the body, A, constructed with a space, E, cylinder, F, and spout, C, I claim the ball valve, H, the whole arranged in the manner substantially as herein set forth.

63,904.—EYELETING MACHINE.—Henri Juge (assignor to himself and Thomas H. Rockwell), New York City.

First, I claim the eyelet clinching head, having a tubular punch or cutter, f, applied to it, in combination with a perforated clinching head, having a pin, h, through it, said parts being arranged and operated so as to cut a hole through cloth or other substance, insert and clinch an eyelet at one operation, substantially as described.

Second, The clinching head, f' provided with a tubular cutting punch, f, substantially as and for the purposes set forth.

Third, In combination with eyelet punching and clinching devices, constructed substantially as described, I claim the moveable tube, i, and movable steam, h h', with their springs, k l, and cam lever, B, arranged so that they shall operate substantially as described.

Fourth, The adjustable pin, C, applied to the cam head, B', of lever, B, for moving the steam, h h', substantially as described.

Fifth, In combination with the machine constructed as herein described, I claim the adjustable gage pin, v, substantially as set forth.

Sixth, In combination with the machine constructed as herein described, I claim the adjustable gage, E, and adjustable gage pin, v, substantially as described.

63,905.—PAPER FASTENING.—James M. Keep, New York City.

I claim the plate, A, provided with a divided tube, B, when used in combination with the plate, C, provided with the conical protuberance, D, and the inner plate, E, in which is formed an opening, F, to receive the tube, B, the cone, D, serving to spread and secure the sections of the divided tube beneath the plate, E, as and for the purpose specified.

63,906.—GARMENT FASTENER.—M. H. N. Kendig, Washington, D. C.

I claim the within-described fastening device, composed of studs or plates, A and A', the latter being provided with a suitable retaining device, D, within which is adjustably secured a chain, B, or equivalent device, the whole constructed and arranged substantially as described.

63,907.—STOVE FOR COOKING.—O. G. Kennel, Ezra Smith, and G. L. Morrison, New York City.

We claim the chambers, H, in the case, A, their lower ends opening into the chamber, G, their outer sides placed a short distance from the side plates, J, their upper edges extending upward within the box, A, and provided with escape pipes, L, said case, A, resting upon the perforated plate, F, of the base, D, when all are constructed and arranged as herein set forth, for the purpose specified.

63,908.—CONCRETE PAVEMENT.—B. N. Laumpum, Rutland, Vt.

I claim the concrete pavement herein described and set forth.

63,909.—CAR BRAKE.—S. M. Lee, New London, Iowa.

First, I claim the device for disconnecting the self-acting brake, when backing the train, consisting of the rope or chain, m, bent shaft, l, chain, i, lever, k, suspended bar, d, provided with a shoulder, c, and lever, b, to which the brakes are attached, or their equivalents, substantially as described.

Second, The rod, F, with hook-shaped end to which the chain, r, is attached, for the purpose of disconnecting the self-acting brake device, and attaching the brakes to the common brake rod and wheel, in combination with the above substantially as described.

Third, The combination of the sliding bar, E, of the above described self-acting brake device, formed arm, p, and rollers, n o, with the rope or chain m, substantially as and for the purposes described.

63,910.—SKINNING CATTLE.—Horatio S. Lewis, Communipaw, N. Y.

I claim the employment of mechanical appliances for removing hides from animals, substantially as and for the purpose described.

63,911.—SWING.—George H. Lupton, Cleveland, Ohio.

I claim the cross bars, B, heads, C, in connection with the seat and swing ropes, substantially as and for the purpose set forth.

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63,912.—CORN WEEDER.—Seth March, Norfolk, Va.

I claim the frame, A, share, B, and detachable heel, C, when these parts are constructed, arranged and combined, as herein specified.

63,913.—ARRANGEMENT FOR CLEANSING WATER PIPE.—Joseph C. Marks and Lewis G. Eckels, Washington, D. C.

First, We claim the arrangement of the pipes, B F C, stop cocks, D G, and strainer, L, constructed and operating substantially as described.

Second, The combined arrangement of the box, A, pipes, B C, cock, G, rod, H, and lid, operating as described.

63,914.—DOOR SPRING.—Jabez F. Mason, Newark, N. Y., and Job Johnson, Brooklyn, N. Y.

First, We claim the bracket, g, formed with teeth, in combination with the cylindrical ratchet, h, and spring, d, substantially as and for the purposes set forth.

Second, We claim the nut, 4, in combination with the cylinder, h, spring, d, and bracket, g, substantially as and for the purposes set forth.

63,915.—MACHINE FOR MAKING CARTRIDGE SHELLS.—Wm. A. McIntire, Springfield, Mass.

First, I claim the combination of the plunger and die for drawing the shell, the slide or equivalent for delivery of the same and the trimming device for the purpose specified.

Second, In combination with the above, I claim the rotating disk, U, and heading device, arranged substantially as described.

63,916.—COTTON PRESS.—John W. McIntyre, Memphis, Tenn.

First, I claim the arrangement of the upper box, provided with slotted sides, C C, with the follower and bar, S, side doors, D D, provided with flanges, f f, and end doors, D' D, the several parts being constructed and used substantially as and for the purpose specified.

Second, The arrangement of the shaft, G, with its attachments with the cords, t t, follower, R, bar, S, and cords, q q, with weights, P P, attached for the purpose of operating the follower in both directions, substantially as specified.

63,917.—APPLICATION OF STEAM POWER TO THE CAPSTANS OF VESSELS.—John S. McMillan, Pittsburg, Pa.

I claim rotating a capstan placed on deck of a boat by means of an auxiliary engine, when said engine and capstan are placed forward of the steam boilers of said boat, substantially as hereinbefore described and for the purposes set forth.

63,918.—STUMP EXTRACTOR.—M. Mellen, Richland Station, N. Y. Antedated April 11, 1867.

First, I claim the combination of the support, D, and pin, a, with the frame, A, of the machine, and the adjustable feet, b, attached to the lower extremities of the support, substantially in the manner and for the purpose herein specified.

Second, The combination of the main shaft, F, and clutch, K, with the loose collar, h, and hook, i, operating substantially as and for the purpose herein shown and described.

Third, The application to the stump extractor of two or more drums, L and M, substantially as and for the purpose herein specified.

Fourth, The adjustable slotted bearings of the axles, H I and K, for the purpose of throwing any portions of the machine in or out of gear, substantially in the manner herein shown and described.

63,919.—RAZOR STRAP.—Charles T. Melvin, Providence, R. I.

I claim a flexible razor strap, capable of being drawn into its receiver by means of a spring.

I also claim a brush and a swivel joint in connection with a flexible razor strap, all substantially as set forth and for the purpose specified.

63,920.—VENTILATING BUNG FOR CASKS, ETC.—Jerome B. Melvin (assignor to himself and Edward B. Howe), Lowell Mass.

I claim the combination of the vent passage, e, the cavity, I, the valve, B, its seat, o o, the pressure chamber, H, and pressure passage, f, with the bung or vent plug, A A, the whole arranged substantially as herein set forth and shown for the purpose specified.

63,921.—MATTING FOR FLOOR COVERING.—John Michell, West Farms, N. Y.

I claim an improved matting formed by the combination of woollen, jute, and Manilla or Russian grass with each other, whether woven plain or twilled, substantially as herein described, as a new article of manufacture.

63,922.—ALARM LOCK FOR TILLS.—D. K. Miller, Bernville, Pa.

First, I claim the two series of bolts, H K, fitted in boxes, C J, attached respectively to the till, and to the under side of the counter or desk, and arranged in connection with a frame, I, to operate substantially in the manner as and for the purpose set forth.

Second, The two series of levers, D D', connected by rods, b, and arranged with springs, E, rods, F, and slides, G, or equivalent means to operate in connection with the bolts, H K, substantially as and for the purpose specified.

Third, The bell hammer or rod, M, provided with the springs, k k', and operated through the medium of the shaft, m, provided with the arms, l o, the projection, p, at the under side of the counter or desk, the arm, N, fitting in the notch in the rod, and the pin, r, extending from the side of frame, I, all arranged so that the bell hammer or rod will be set each time the till is shoved inward, and the hammer or rod liberated and the alarm sounded each time the till is slightly drawn outward in an unlocked state, substantially as set forth.

63,923.—STEAM GENERATOR.—Joseph A. Miller, New York City.

I claim the combination of the water base, B2, grate, A2, steam generating tubes, C2, and jacket, g2, to the fire-box roof, E2, cylinder or upper chamber, G2, return water pipes, D2, and smoke tubes, 12, the whole being arranged relatively to each other, substantially as specified.

63,924.—HOTEL REGISTER.—John L. Mitchell, Buffalo, N. Y. Antedated Dec. 5, 1866.

I claim a hotel register book with interleaves of bibulous paper with advertisements displayed thereon substantially as specified.

63,925.—APPARATUS FOR FEEDING LIQUID TO EVAPORATING PANS OR BOILERS.—S. A. Mitchell, Alstead Center, N. H.

First, I claim the invention of a self-adjusting feeder to any number of boilers required, from one faucet or feed pipe, by means of a buoy or buoys, E, acting on the flow of liquid by means of a stopper, Q, or any similar device.

Second, The immersed buoy, N, connecting rod, M, the beam, K, standard, L, the pivot, m, in standard, L, the connecting rod, J, the eye bolt, n, in cistern, A, operating on conductor, D, as herein set forth.

Third, The small buoy, H, acting by means of the beam, b, upon the valve, U, for the purpose of controlling the flow of fluid in the aperture, V, as herein described.

Fourth, The combination of the buoys, E H and N, conductors, D and O, the standards, F and L, sockets, G c and d, the beams, K and b, the connecting rods, J and M, the pivots, P m a and c, the brace, C, stopper, Q, valves, U and f, the eye bolt, n, and the perforated guard, g, arranged and operated as herein set forth, or in a manner practically the same for the purpose specified.

63,926.—COAL STOVE.—George R. Moore, Lyons, Iowa.

I claim the hinged cover, C, so arranged and operating as to smother the fire and check combustion when turned down to a horizontal position, and to form a diving flue between the combustion chamber and the smoke pipe when turned to a vertical position, substantially as described.

63,927.—BOLT AND RIVET MACHINE.—John Morgan, Jr., Wheeling, West Va.

First, I claim the combination of the die stocks, Y, lever rods, O, stirrups and cams, substantially as arranged and set forth.

Second, The arrangement of the header, V, plunger, U, cams, F and E, loose stirrups and thumbscrews, A B.

63,928.—TURNING LATHE.—H. L. Morse (assignor to S. A. Morse), New Bedford, Mass.

First, I claim the method of adjusting the movable plate, C, consisting of a combination with each other of the circular projections, d d, grooves, e e, screw, D, and nut, f, substantially as herein shown and described.

Second, The arrangement of the scale or index to the rear end of the lathe bed, in combination with the adjustable plate, C, substantially as shown and described for the purposes herein set forth.

Third, The gage, G, constructed of a right-angular bar pivoted to the foot stock, F, in combination with the adjustable plate, C, and adapted for the purpose described when the tool is set to the point of its shorter arm, as herein specified.

63,929.—CLAMP.—S. A. Morse, New Bedford, Mass.

I claim the stock, A, provided with an upright ledge or bearing surface, a, in combination with the sliding plate, B, provided with the lever, C, having the self-adjusting plate, D, attached and operated by the cam, E, or its equivalent, substantially as and for the purpose herein set forth.

63,930.—DRAFT ATTACHMENT FOR VEHICLES.—Edward Nason, Wm. Nason, and Oliver K. Nason, Orneville, Me. Antedated April 11, 1867.

We claim the arrangement of the straps, E, snap hooks, F, rods, C, in combination with the whiffletree, B, and collar, D, and operating in the manner and for the purpose herein specified.

63,931.—WAGON BOX.—Geo. W. Oviatt, Potter Center, N. Y.

First, I claim securing the sides of a wagon box to the bottom by means of the bolts, H and I, substantially as specified.

Second, I claim securing the end boards of a wagon box in their places by the use of the spring catch, D, and catches, E and E, as herein specified.

63,932.—GATE.—Calvin H. Paine (assignor to himself and Wm. D. Hilton), Providence, R. I.

I claim the combination of the gate or lazy tongs and mechanism for opening and closing it by means of a carriage, substantially as described.

I also claim the combination as well as the arrangement of the two sets of levers, D D and F F, the connection piece, h, and the series of T-pieces, l, the whole being for operating as specified the gate constructed on the principle and applied to a post, B, substantially as described.

63,933.—HAME FASTENER.—W. W. Palmer, Hudson, Mich.

I claim the metallic bar, B, with its keepers, C C, and curved spring, D, when used in combination with the bar, A, in the manner and for the purposes specified.

63,934.—CURTAIN FIXTURE.—C. C. Parker, Brooklyn, N. Y.

I claim the pulley slide formed with two arms at right angles to each other, one arm, e, receiving the pulley and the other arm, f, extending within the coils of a helical spring, c, within the slotted case, a, so that said arm, f, becomes a guide to sustain the pulley but allow its free motion, as set forth.

63,935.—WRENCH.—James A. Partridge (assignor to himself and E. D. Wright), Lowell, Mass.

First, I claim the liberating lever, A, applied to the movable jaw of a slide wrench when said lever has a segmental nut formed in the end, b, thereof, to engage with the screw, G, and a spring, g, at or near the end, d, to throw the nut into contact with the screw, and all arranged to operate substantially as and for the purpose set forth.

Second, The shoulders, e1 and e2, constructed and arranged to operate substantially as and for the purpose set forth.

63,936.—MACHINE FOR MAKING HOOP SKIRTS.—S. H. Perkins and Thomas S. Gilbert, New Haven, Conn.

We claim automatically measuring, marking, and cutting wire for skirt hoops, substantially as herein set forth.

63,937.—PUMP.—Alonzo Perry and Moses C. Hawkins, Edenboro, Pa.

We claim the construction and arrangement of the double-armed reciprocating piston, C, having valves, F, its hub, E, working air tight between the angles of the perforated partition plates, J, thereby forming the chambers, F2, in the cylinder, A, valves, I, in the chambers, G H, discharge ports, M, in the sections of the chamber, F, uniting and forming the tube, N, upon the upper half of the cylinder, A, as herein shown and described.

63,938.—SASH AND BLIND FASTENER.—L. Pollock, Fishkill Landing, N. Y.

I claim the combination of the screw bolt, E, provided with the square part, e2, and the sliding bolt, H, constructed and operating substantially as described and for the purpose set forth.

63,939.—APPARATUS FOR GUIDING CLOTH.—Elisha O. Potter, North Providence, R. I.

First, I claim in an apparatus for guiding cloth, paper, or other like material, during its delivery to other machinery, the combination of a beam capable of an endwise movement with the selvedge edge of the material as it is being unrolled, in the manner substantially as described, for the purposes specified.

Second, The combination in an apparatus for the above declared purpose of the following instrumentalities:—A beam capable of an endwise movement, a rack pinion, d e, and a double pawl and ratchet gear, E' g g, or the equivalents thereof, substantially as described.

Third, The combination in an apparatus for the above declared purpose of the following instrumentalities:—A mechanism for imparting an endwise movement to the cloth beam as above described, a disk plate, H, and vibrating bent lever, I, or the equivalents, for putting into action or suspending the operation of the mechanism of the shifting the position of the beam, substantially as described.

63,940.—CAR COUPLING.—Narcisse Reeves, Du Quoin, Ill.

I claim the combination of the sliding block, H, and weighted arm, J, with the link, D, and bumper, G, substantially as herein shown and described and for the purpose set forth.

63,941.—CORN-HUSKING SHIELD.—Almon C. Robinson, Louisiana, Mo.

I claim a corn-husking metal shield to wear upon the thumb of either hand, constructed and operating substantially as herein shown and described.

63,942.—BOTTLE STOPPER.—Robert Robinson, Brooklyn, N. Y.

I claim closing the neck of the bottle by means of the stopper, A, constructed as described, having its ends, a1 a2, of greater diameter than its center, and by placing the elastic band, B, over the upper end, a1, and after being inserted in the neck of the bottle, pressing said elastic band down upon the part, a2, of increasing diameter, as herein shown and described.

63,943.—MATCH SAFE.—John Roebuck, New York City.

I claim the match safe, A, consisting of the bottom piece, b, back piece, c, sides, a a, falling lid, d, hinged in the groove, f, and waste match receiver, e, constructed and arranged as herein shown and described.

63,944.—BIT STOCK.—Clemens B. Rose, Sunderland, Mass.

First, I claim the bit stock provided with the socket, D, the sliding jaws, b, having the inclined heads, d, and projecting or raised screw threads, c and ring, B, all constructed and arranged to operate as herein shown and described.

Second, Connecting the head, K, to the shaft by means of the grooves, i i and L, and the collar, O, melted in around them, substantially as set forth.

63,945.—LEVER SHEAR.—John J. Sandgren, Lyons, Iowa.

I claim the peculiar arrangement and combination of the levers, E and F, with the cam, J, and straps, K G and H, all for the purposes set forth.

63,946.—SKATE.—H. W. Sanford, Thomaston, Conn., assignor to himself and Horace Smith.

I claim the vibratory or lever runner, B, in combination with the sliding clamping jaws, t t' and w w', and the skate stock, the whole constructed in the manner and operating as hereinbefore described for the purpose set forth.

63,947.—BEER COOLER.—Amos W. and James Sangster, Buffalo, N. Y.

First, We claim the cone-shaped coolers connected together as described also in connection therewith of one or more partitions as shown at G, or the equivalents thereof for the purposes described and set forth.

Second, In combination with the cone or cones, we claim the tubes, D D3 D1 and D2, substantially as herein described.

Third, We claim the employment of a corrugated surface on the upper part of the cone as shown in fig. 3, for the purpose of more equally distributing the liquid to the cooled as it flows over said surface.

Fourth, We claim the plate, E, as and for the purposes described.

63,948.—BENCH PLANE.—Charles H. Sawyer, Hollis, Me.

I claim the arrangement of the screw, B, in combination with the joints or pivots by which the sheet m, is connected at its ends to the ends of the handle or stock, A, as and for the purposes herein described.

63,949.—PROCESS OF WHITENING HORN.—Augustus Scheller, New York City.

I claim the within described process of whitening horn or other similar substances by treating with acetate of lead or any other solable salt or oxide of lead and with muriatic acid, substantially in the manner set forth.

63,950.—TWINE HOLDER.—Frederick J. Seymour, Wolcottville, Conn.

I claim a twine holder formed of a metallic case fitted so as to be suspended and provided with a brake to prevent the cord or twine running out by its own weight as specified.

63,951.—PRESS BOARD FOR AN OIL PRESS.—John Shinn, Leverington, Philadelphia, Pa., assignor to himself and G. S. Rhoades.

I claim a press board or plate formed with grooves running parallel or otherwise, in combination with a wire screw as described for the purpose set forth.

63,952.—DRAINING AND DITCHING PLOW.—Henry B. Smawley, Greensburg, Ind.

I claim the arrangement of the share, B, provided with two connected but distinct points one in advance of the other, with the cutters, C D, as constructed and connected to the beam, and the inclined plane, K, provided with a back bone or brace on its under side, the several parts being used together, substantially as and for the purpose specified.

63,953.—COAL SCUTTLE.—Gaston D. Smith, Washington, D. C.

I claim the perforated malleable cast iron bottom plates, a b, and collar, x, of a coal hod, provided with an ash box, B, attached to it by a bayonet joint, when the same is constructed and arranged as and for the purpose set forth.

63,954.—DRAFT PLATE.—George Smith, Providence, R. I.

I claim. First, The construction of the open or skeleton plate, A, with a horizontal thill supporting shelf, B, formed on its lower edge, and two or more tenons or lugs, a a, for receiving openings in the bottom of a thill, substantially as described.

Second, The longitudinally sliding head, D, fixed guide rod, f, and central spring, g, applied to the right angular draft plate, A B, substantially as described.

Third, The two slots, d' and e', when arranged on each side of the sliding head, D, of the draft plate, A B, as described and for the purposes set forth.

Fourth, The combination of the slotted bars, d, and e, upright bars, c and c', and shaft, B, constructed of one piece of metal and adapted to serve the improved purposes described.

63,955.—HOISTING MACHINE.—Hiram Moore Smith, Richmond, Va.

I claim when applied to a hoisting machine, the double wheel on the cylinder, A, the two pinions combined and working on the rope wheel shaft the crank and loaded wheel for moving and holding them securely in gear, the whole constructed and operating as above described and set forth.

63,956.—FIRE CHAMBER FOR FURNACES.—Sidney Smith, Worcester, Mass.

I claim the cast iron, perforated flanged and rebated staves B, for the purpose of forming a fire chamber, substantially in the manner set forth.

A fire chamber constructed substantially in the manner described, so as to be removable entire from the frame or casing supporting it, for the purpose set forth.

In combination with the trap G, the arm H, and ratchet shaft I, substantially as and for the purpoes set forth.

In combination with the fire chamber claimed in the second claim, the rollers K, substantially as and for the purpose described.

In combination with the fire chamber claimed in the second claim the removable front J, substantially as and for the purpose set forth.

63,957.—EVAPORATOR FOR SACCHARINE JUICES.—George L. Squier, Buffalo, N. Y.

First, In a series of two or more evaporating pans, arranged and used for evaporating saccharine juices, I claim making the bottoms of such pans of different thicknesses of metal for the purposes and substantially as specified.

Second, In a series of two or more evaporating pans arranged and used for evaporating saccharine juices, I claim making such pans of different depths for the purposed and substantially as set forth.

Third, An air pipe or pipes or conductors so connected and arranged with an evaporating pan or pans for treating saccharine juices that currents of hot or cold air (either or both) may be forced through or into the juices during either part of the process for the purpose and substantially as set forth.

Fourth, Regulating and controlling the temperature of saccharine juices by means of hot or cold air forced therein in the process of evaporation substantially as set forth.

Fifth, Placing or arranging an air pipe within the furnace, so that the same fire used for heating the evaporating pans may also be used for heating the air.

Sixth, The plate K, placed in the evaporating pan for the purpose of spreading the air and for drawing the scum to the centre substantially as described.

Seventh, Dividing the furnace in the rear into two flues with a damper at each flue, in connection with evaporating pans, constructed and arranged as herein described.

63,958.—RUBBER HEEL STIFFENER.—Edgar M. Stevens, Chelsea, Mass., assignor to himself and John A. Mendum, Roxbury, Mass., assignors to A. B. Ely, Newton, Mass.

I claim a molded heel stiffening of rubber or similar elastic material having a slit or slits cut in the rear portion of the lower and under rim as and for the purposes set forth.

63,959.—DAMPER FOR STOVE PIPES.—W. X. Stevens, Worcester, Mass., and W. E. Puffer, Lexington, Mass.

First, We claim keeping two or more parts of a stovepipe damper in the desired relation to each other by means of the turning bar used as a pin in the manner and for the purposes set forth.

Second, The combination and arrangement of frame A, gate B, and bar C as specified and for the purposes set forth.

63,960.—DEVICE FOR WASHING CARRIAGE WHEELS.—Wm. T. Sweet, Fayette, N. Y.

I claim a receptacle A, provided with sockets c c, and brushes 11, operating substantially as and for the purpose herein set forth.

I also claim the folds g g, or equivalent in combination with the receptacle A, operating substantially as and for the purpose specified.

63,961.—ANIMAL TRAP.—Jesse Teed, Tompkins, N. Y.

I claim the combination of the spring trap A, (composed of one piece) and having two supporting legs B B, and the detachable brace or triggers C, arranged and operating in the manner shown and described, and for the purpose set forth.

63,962.—HINGE FOR SHUTTERS.—Lawrence Tevis, Philadelphia, Pa.

I claim a self catching hinge, provided with cam D, lug o, pin P, and catch c, the whole combined and constructed in the manner and for the purpose above described and set forth.

63,963.—APPARATUS FOR TREATING PETROLEUM.—Alexis Thirault, Williamsburg, N. Y., assignor to himself and B. S. Hilton, New York City. Antedated April 5, 1867.

First, I claim the arrangement of one or more steam jets a in combination with the condensing coil A, constructed and operating substantially as and for the purpose set forth.

Second, The steam jets d, or d,' applied in combination with tanks C or C', and with the pipes carrying the oil into said tanks substantially as and for the purpose described.

Third, The jets d* or d'* in combination with the tanks C or C', constructed and operating substantially as and for the purpose set forth.

Fourth, The combination of the coil A, tanks C C' C*, steam jets a d d* d' d** and coils k1, all constructed and operating substantially as and for the purpose described.

63,964.—SPIRIT METER.—Isaac P. Tice, New York City. Antedated April 5, 1867.

I claim, First, The diaphragm measuring can or cans constructed so as to form a chamber above and below and provided with valves to admit and discharge the liquid into and from the lower chamber of each can by the movement or action of the latter, substantially as specified.

Second, In combination with the measuring or weighing cans the valves controlling the entry and discharge of the liquid thereto or from, constructed so as to spring or yield on the cans reaching the end of their strokes to give time and space for the locking of the raised can, essentially as herein set forth.

Third, The combination of the diaphragm, measuring or weighing cans, tilting hopper, G, and floats, K K', with locking and unlocking devices under control of the floats, substantially as specified.

Fourth, The combination with a liquid meter of a device for closing the induction or passage of liquid through the meter so operated or set in motion automatically by the liquid in the eduction passage as to prevent tampering with the meter, essentially as herein set forth.

Fifth, The combination with a vessel within the meter, of a detector arranged within said vessel and operated by the liquid rising therein to record any attempt at tampering with the meter, substantially as specified.

Sixth, The combination, in a spirit meter, of a hydrometric and therometric register with a counter or indicator of quantities for operation together by the weight or action of the liquid or other motor in passing through the meter, essentially as specified.

63,965.—MEDICAL VEGETABLE LINIMENT.—Thomas L. Upton, Farmington, West Va.

I claim the liniment consisting of the ingredients named in about the proportions specified and compounded substantially as and for the purpose set forth.

63,966.—MEDICAL VEGETABLE SALVE.—Thomas L. Upton, Farmington, West Va.

I claim the salve consisting of the ingredients named in about the proportions specified and compounded substantially as and for the purpose set forth.

63,967.—DEVICE FOR SACKING GRAIN.—Peter Von Lackum St. Charles, Minn.

I claim First, The elevator, A B E, provided with the adjustable tube, a, having hooks for attaching the bag or sack, arranged to operate substantially as shown and described.

Second, The combination of the adjustable tube, a, cords, b, lever, d, and ratchet, f, when arranged for joint operation, as set forth.

63,968.—METHOD OF OBSTRUCTING ICE IN RIVERS AND HARBORS.—Peter Voorhis, New York City.

I claim the combination of floating iron-clad obstructors with anchors, arranged to operate substantially in the manner and for the purposes herinbefore described.

63,969.—CHURN.—Thomas A. Warren, Gettysburg, Pa.

I claim the arrangement of the horizontal churn box, provided with a curved corrugated or irregular bottom, with the shaft, C, and frame, D, provided with arms, d, revolving in different directions, and with the wheel, K, the whole being constructed and used in the manner and for the purpose specified.

63,970—APPARATUS FOR PURIFYING WASH FOR THE MANUFACTURE OF VINEGAR.—Gardner Waters, Cincinnati, Ohio.

I claim the apparatus made and operating substantially as above set forth and described.

63,971.—SEAMING TOOL—Philip Weck, Brooklyn, N. Y.

I claim a tool consisting of a frame, B, provided with a series of rollers whether more or less in number, when one or more of such rollers are arranged so as to be slid or moved in or out upon the said frame, substantially as and for the purpose described.

63,972—CATTLE PUMP.—Milo D. Wilder, Laporte, Ind.

I claim the tubular driving lever, C, in combination with a pump and a trough, which pump is operated by gearing, substantially in the manner herein shown and described.

63,973.—MOP SQUEEZER.—E. S. Wilkins and John Straw, Stowe, Vt. Antedated March 14, 1867.

We claim the treadle, R, mop squeezer, G and H, and spring lever, M, and pail, B, when arranged, combined, and operated as herein described and for the purposes set forth.

63,974.—GATE.—Horace S. Wolf, Rolling Prairie, Ind.

I claim the application of the lever herein described, by means of which to elevate the entire gate, and that too with the least possible labor.

63,975.—INKING APPARATUS.—George W. Wood, Richmond, Ind.

I claim, First, The use in an inking apparatus of one or more inking belts for conveying the ink whether applied automatically from a fountain or by hand.

Second, The combination of a fountain from which the ink is transferred to the inking belts and the distributing rollers.

Third, The combination of one or more inking belts, and the composition rollers from which the ink is transferred to the type.

Fourth, The combination of the driving roller, I, the inking belts and distributing rollers turning upon their axes, and having a longitudinal reciprocating motion.

Fifth, The arrangement of the distributing rollers and inking belts, so that the former shall have a revolution upon their axes, and at the same time an alternately reciprocating motion in opposite directions longitudinally in contact with the face of the belt.

Sixth, The combination of the adjustable fountains, the soft rollers attached to an oscillating frame, and adjustable rollers around which the inking belts are carried.

63,976.—STEAM-ENGINE GOVERNOR.—John B. Wood, Brooklyn, N. Y.

I claim the piston, i, spring, n, and connections, k l, to the throttle valve, in combination with the pump, a, and valve, q, operated by a connection, s, to the piston, i, as and for the purposes specified.

63,977.—FRICTION CLUTCH.—Sylvester C. Wright, Fitchburg, Mass.

I claim, as my invention for effecting the movements of the clutch plate, D, the combination of the auxiliary male screw, h, and its bar or nut, E, with the nut, G, and its male screw, f, having their threads pitched in opposite directions to those of the screw, h, and nut, E, the whole being applied substantially as explained to the parts or shaft, C and H, projecting from the gears, A B, and the clutch, D, as set forth.

I also claim the arrangement of the auxiliary nut, E, and its screw, h, at either end of the shaft, H, as hereinbefore set forth, when combined with plate, D, tube, c, and nut, G.

I also claim the combination as well as the arrangement of the oil passages,

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k l, with the bearing, F, the shaft, C, and the clutch plate, D, applied to the shaft by means substantially as specified.

63,978.—CASTING SHUTTLE.—C. E. Billings, Hartford, Conn.

First, I claim the dies, C and D, with cavity, a, and projection. b, for the purpose of forming the shuttle frame, arranged substantially as described.

Second, The dies, E and F, the cavity, c, and projection. d, for the purpose of finishing the shuttle frame, arranged substantially in the manner described.

63,979.—MACHINE FOR GRINDING AND AMALGAMATING ORES.—Philip Hinkle (assignor to himself and Charles S. Capp), San Francisco, Cal.

First, I claim the employment of the renewable side dies, G G, to form a perpendicular grinding surface on the sides of the tub or pan, substantially in the manner and for the purpose described.

Second, The employment of the perpendicular muller hangers, E E, loosely hung on the pins, C C, carrying the renewable mullers or grinding plates, F F, of the shape shown in the drawings, thrown and passed laterally by centrifugal force against the perpendicular grinding surface, G G, when the arms, B B, are revolved, with the supporting lip, l, and bearing surface, D, upon the arms, B B, by which arrangement the pressure is lightest at the feeding point and heaviest at the heel of the muller, and also the provision for loading the muller hanger to counterbalance the loss of weight by wear of the face of the muller, F, substantially in the manner and for the purpose described.

Third, The shape and arrangement of the cover of the pan, U, so as to form a flattened funnel-shaped dish, with annular grooves, S, for mercury and raised current breaking ring, W, on its upper surface, the collars or projecting flange, V, with the apertures, R R, under it, by which the escape of the pulp is permitted, and its current directed so that it is returned to the center, and a continual circulation maintained.

RE-ISSUES.

2,558.—POWER CAPSTAN.—D. N. B. Coffin, Jr., and Irah D. Spaulding, Boston, Mass., assignees of D. N. P. Coffin, Jr. Patented Nov. 21, 1865. (Div. 1).

First, We claim the conical or taper gears, h g f e, and the angular shafts, j, in combination with the barrel of a capstan, substantially as described.

Second, Connecting the fulcrum gear, e, to the bed plate automatically by furnishing each with a series of inclined faced lugs, substantially as described.

Third, Duplicating the inclined faces of the lugs, i, on the fulcrum gear and the bed plate in reverse order so as to operate both ways.

2,559.—POWER CAPSTAN.—D. N. B. Coffin, Jr., and Irah D. Spaulding, Boston, Mass., assignees of D. N. B. Coffin, Jr. Patented Nov. 21, 1865. (Div. 2).

First, We claim the inclined or wedge-shaped lifter, q, made movable separately from the parts to be locked together in combination with the sliding bolts of a capstan, substantially as described.

Second, The arrangement of one or more series of inclined or wedge-shaped lifters upon a ring or circular connection, p, so as to operate simultaneously on several bolts in the locking mechanism of a capstan, substantially as described.

Third, Casting the lower journal part of the spindle or shaft of a capstan on and as a part of the bed plate.

Fourth, Casting the lower journal part of the spindle or shaft of a capstan hollow in combination with its formation and as a part of the bed plate irrespective of the construction of the upper portion.

Fifth, Compounding the spindle or shaft of a capstan by forming the lower journal part on and as part of the bed plate and inserting the comparatively lighter wrought part to form the upper portion, substantially as described.

2,560.—HORSESHOE,—Oliver P. Macgill and T. Poultney, Brooklandville, Md., assignees of Oliver P. Macgill. Patented April 11, 1865.

We claim a false or supplemental shoe provided with ice calks and so constructed that it may be clamped to or confined upon the shoe of the horse by means of griping flanges and a clamping screw without the necessity of any screws, keys or other devices entering the stock or metal of the shoe on the horse's foot.

We also claim making the supplemental shoe in two parts hinged together in combination with the flanges, D D, or their equivalents, and the tightening screw in order that the said shoe may be clamped only to the inner edges or portions of the shoe of the horse, substantially as described.

We also claim making the ice calks, J, removable and constructed and combined with the false shoe, in the manner described for the purposes set forth.

2,561.—TOBACCO POUCH.—Winfield S. Sims, Newark, N. J. Patented Feb. 26, 1867.

First, I claim the tobacco pouch, A, formed with two openings, one for the reception of the nozzle and the other for the reception of the rod or rammer, as described.

Second, claim the combination of the pouch, A, with the nozzle, B.

Third, I claim the combination of the pouch, A, nozzle, B, rod, E, substantially as and for the purpose described.

2,562.—HOE.—Theodore R Timby, Saratoga Springs, N. Y. Patented March 5, 1867. (Div. A).

I claim the hoe with its peculiar angular edge, as described.

2,563.—HANDLE FOR IMPLEMENTS.—Theodore R. Timby, Saratoga Springs, N. Y. Patented March 5, 1866. (Div. B).

I claim a metallic lapped thimble or ferrule for handles of agricultural implements and other useful articles.

2,564.—MACHINE FOR GRINDING SHEET METALS.—The Bridgeport Brass Company, Bridgeport, Conn., assignees of Henry Todd. Patented March 5, 1867.

First, I claim the combination of the trough, B, provided with strips or corrugations, b, and presser, B, constructed substantially in the manner described so as to grind the surface of sheet metal drawn there through.

Second, The combination of the trough, B, provided with strips or corrugations, b, and presser, C, provided with strips or circulations, c, with the mechanism constructed and arranged so as to draw the sheet between the scouring surface of the trough and presser, substantially as specified.

Third, In combination with the trough, B, and presser, C, the removable sleeve, G, and reversely rotating shafts, E and F, essentially as and for the purposes herein set forth.

2,565.—WATER-PROOF SOLE.—The Water-proof Sole Company, New Haven Conn., assignees by mesne assignments of John W. Coburn. Patented June 27, 1865.

First, We claim a compound sole presenting a surface of rubber or analagous gum or its compounds over the main portion of the sole and a border of leather, the gum having been applied to the leather while soft and vulcanized threon, substantially as and for the purposes herein specified.

Second, We claim in combination with the above, causing the vulcanized material to extend through from one face of the sole to another through a hole provided for the purpose in the leather, substantially in the manner and for the purpose herein specified.

Third, We claim in compound soles having rubber vulcanized with leather as specified, the protension of the rubber face outside of and beyond the face of the leather edging substantially as represented in fig. 4, and for the purpose herein specified.

Fourth, We claim in compound soles of rubber and leather covering the surface in the whole or in part with thin rubber cloth or analogous strong fibrous material attached so as to serve in connection with the rubber and leather substantially in the manner and for the purposes herein set forth.

2,566.—METHOD OF OPERATING RAILROAD PUMPS.—Samuel Moss, San Francisco, Cal., assignee of Gilbert Cole. Patented Dec. 16, 1862.

First, I claim conducting by means of connecting pipes, the steam generated in the locomotive boiler to a stationary engine by the road side, to operate the same as and for the purpose set forth.

Second, The combination of a stationary engine and pump, the connecting pipes, c c', and a locomotive boiler, as and for the purpose described.

2,567.—SEWING MACHINE.—Alfred B. Ely, Newton, Mass., assignee of Reuben W. Drew. Patented June 30, 1863.

I claim the application of heat by or through the flame of a lamp, gas burner or their equivalent to the metallic arm of a waxed thread sewing machine in or along which the thread may pass, for the purpose of warming the thread and making it pliable, substantially as described.

2,568.—WINDOW SASH FASTENING.—M. B. Stafford, New York City. Patented Jan. 27, 1863.

First, I claim the combination in the window fastener, of the fastening bar, B, and recessed ledge, f, substantially as herein shown and described.

Second, The combination in the window fastener of the recessed ledge, f, with a ledge, l, and fastening bar, B, substantially as herein shown and described.

Third, The employment in the window fastener of the divided fastening bar, constructed substantially as herein shown and described.

2,569.—MANUFACTURE OF CAUSTIC ALKALI.—George Thompson, East Tarentum, Pa. Patented Oct. 21, 1856. Reissued Feb. 1, 1859. (Div. A).

I claim as a new article of manufacture, caustic alkali enclosed in an integument or casing of anti-corrossive, impervious fabric, substantially as above described.

2,570.—PROCESS OF PUTTING UP CAUSTIC ALKALI.—George Thompson, East Tarentum, Pa. Patented Oct. 21, 1856. Reissued Feb. 1, 1859. (Div. B.)

I claim the process of putting up caustic alkali in metallic casing or integument, by pouring the molten caustic alkali into the casing, substantially as above described ann then closing up the top of the case.

2,571. — MANUFACTURE OF CAUSTIC ALKALIES. — George Thompson, East Tarentum, Pa. Patented Oct. 21, 1856. Reissued Feb. 1, 1859. (Div. C).

I claim the caustic alkali encased or enveloped in a tight metallic integument or metallic casing, substantially as above described.

DESIGNS.

2,614.—CIGAR BOX.—Frederick Becker, Baltimore, Md.

2,615.—CASKET HANDLE.—Wm. M. Smith, West Meriden, Conn.

2,616.—CARPET PATTERN.—Alexander Beck, Philadelphia, Pa. Division A.

2,617.—CARPET PATTERN.—Alexander Beck, Philadelphia, Pa. Division B.

2,618.—PRINTERS' TYPE.—David Bruce, Newtown, N. Y.

2,619.—WASH STAND.—J. L. Mott, Mott Haven, N. Y. Division A.

2,620.—WASH STAND.—J. L. Mott, Mott Haven, N. Y. Division B.

2,621.—STOVE HANDLE.—J. S. Simmerman, Millville, N, J.

2,622.—HAT.—P. W. Vail, Newark, N. J.

2,623.—SHADE FOR A CEILING LIGHT.—Charles Wilhelm and Joseph Neumann, Philadelphia, Pa.

2,624.—LANTERN REFLECTOR.—Charles Wilhelm and Joseph Neumann, Philadelphia, Pa.

2,625.—STOVE DOOR.—Chas. J. Woolson, Cleveland, Ohio.

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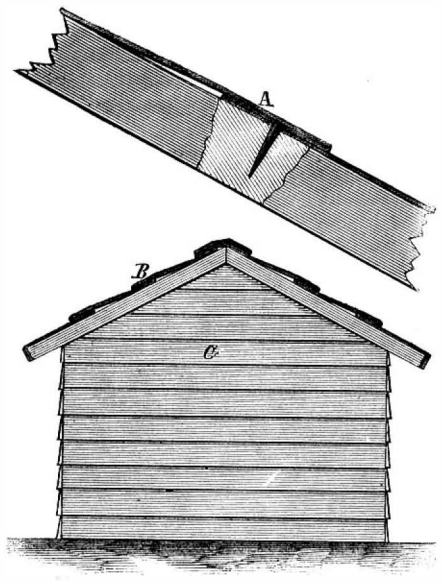

The improvement is the subject of a patent issued through the Scientific American Patent Agency to C. J. Fay, in January, 1867, and includes the method of attaching the paper to the roofs, sides, flooring and ceiling of buildings, and to the decks of vessels, to awnings and carriages. The paper is manufactured in strips of proper width for the purpose required, and creased at regular intervals for folding and marked for the insertion of the nails or tacks which secure it to the surface on which it rests. The plan protects the nails from oxidation by covering them with the impervious paper. This method may be seen at A, where the tack is driven through the paper into the board and the paper is then folded over it. It is used on the siding or roof of a house in the same manner, as seen at B and C.

It is claimed that for weather boarding, half-inch lumber is as good where this paper is used as inch stuff, where it is not used. The boards, even for the roof, need not be tongued and grooved, only matched by the saw. For floors, it is tacked down, and then painted if the floor is not to be carpeted. No moths will attack a carpet laid on this paper. For walls and ceilings it is intended to supersede laths and plaster, and it can be painted as desired, will wash clean without injury, and is said to be far superior for warmth to any plaster.

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In No. 4, current volume we illustrated a rail made of Bessemer steel and iron at the Wyandotte Rolling Mills, at Wyandotte Mich. The heads are of steel and the web and bottom of iron. A few weeks ago a test of the security of the weld was made, an acocunt of which we copy from the *Journal of the Franklin Institute*:—

"A weight of sixteen hundred pounds was allowed to fall four feet upon a piece of Doddized rail five feet long; it broke at the first blow. A piece of the steel-headed rail made at Wyandotte was then put under the drop, and subjected to four blows as follows: For the first blow the weight was raised five feet; for the second, ten feet. The rail was then turned over, and received the third blow with a fall of fifteen feet; and the fourth blow with a fall of twenty feet, bent the rail almost double. The rail was then taken to the steam hammer whose weight was eight thousand eight hundred pounds, and received ten or twelve blows."

"When the bar was nearly straightened out, it broke, but the iron and steel remained perfectly welded together. One of these pieces was then subjected to one hundred blows from the eight thousand eight hundred pound hammer on the head on the rail, as follows: Fifty blows at two feet fall, and fifty at three feet fall. This crushed the rail without breaking the weld of the iron and steel."

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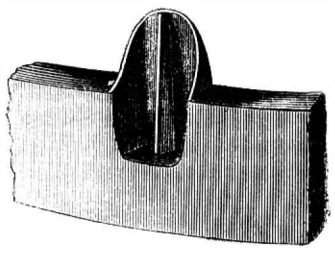
This calk is formed with a ribbed projection produced by a displacement of its metal. The bar, when hot, is placed upon a die and with a blow the recess and central projection is formed. The ordinary calk is made by one end being drawn to a point and turned up at a right angle. This entails more labor and by being forced into the shoe weakens it, while the welding of the projection on this improved calk to the shoe adds to its strength. It is claimed that this calk has



advantages over both the ordinary and the two pronged calk, in greater durability of the shoe and greater economy of labor and material.

These calks can be made upon the anvil or from the bar under a drop, which for this purpose may be made very cheaply. The union between shoe and calk is very perfect, partaking of the nature of a dovetail, as the toe of the shoe is driven into the recess of the calk while the projection of the calk is welded into the shoe.

This device was patented Feb. 12, 1867, and rights of territory or manufacture may be obtained of Custer & Tull, Monroe, Mich.

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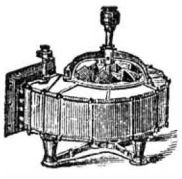

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